

Review Article

Investigating the relationship between bullying involvement and self-harmful thoughts and behaviour in young people: A systematic review

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ABSTRACT

Background: There is a complex and inconsistent relationship between bullying involvement and self-harmful thoughts and behaviour (SHTB) in young people. This novel systematic review aims to establish key interacting, moderating and mediating variables associated with SHTB in young people involved in bullying.

Methods: The systematic review was registered with PROSPERO: CRD42020192023. A search was conducted (until February 2021) across databases: PubMed/MEDLINE, EMBASE, PsycINFO (Ovid), Cochrane Library, Scopus (Elsevier), Web of Science, ERIC and CINAHL (EBSCOhost). Observational studies containing quantitative primary or secondary data analyses were included in the review, on the basis that they examined interactions, moderators, or mediators between bullying involvement and SHTB in young people. Versions of the Newcastle-Ottawa Scale were used to assess risk of bias in the included studies.

Results: A total of 57 studies were included. Overall, 3 studies identified interactions, 25 studies identified moderators and 21 studies identified mediators. 9 studies identified moderator-mediators. The findings were categorised as either self-harmful thoughts or self-harmful behaviours and synthesised under the following themes: socio-demographic; depression; parental; personality/psychological; and social/environmental.

Limitations: This review uncovered significant heterogeneity and a paucity of replicated studies in the field, therefore, tentative conclusions have been drawn.

Conclusions: This comprehensive review highlights the key role of depression as a mediator between traditional/cyber victimisation and SHTB in young people. The moderating effects of gender on mediation models investigating the role of depression suggest the possibility that females involved in bullying may be at increased suicide risk.

1. Introduction

Across the globe, suicide is a serious concern requiring urgent attention. In 2016, suicide was the second leading cause of death globally among youth aged 15–29 years (World Health Organization, 2019). It is recognized that self-harm, which is defined as “an intentional act of self-poisoning or self-injury, irrespective of the motivation or apparent purpose of the act” (National Institute for Health and Care Excellence [NICE], 2004), is the strongest known predictor of death by suicide and is a growing concern in young people (Hawton et al., 2012).

One factor that is known to increase the risk of self-harmful thoughts

and behaviour (SHTB) is bullying involvement. High quality systematic reviews have evidenced a significant association between bullying involvement and self-harm, suicidal ideation, and suicidal behaviour in youth (Holt et al., 2015; John et al., 2018; Katsaras et al., 2018). Bullying involvement is used here as an umbrella term, which involves the context in which it takes place (i.e., traditional face-to-face or cyber), the involvement (i.e., victim, perpetrator, or perpetrator-victim) and the nature of the involvement (i.e., physical, verbal, relational etc.). Hence, research has indicated that a range of young people are at risk of harm, including victims, perpetrator-victims, and perpetrators alone (Benatov et al., 2021; Brunstein Klomek et al., 2007; Kaminski and Fang, 2009).

Abbreviations: SHTB, Self-harmful thoughts and behaviour; SI, Suicidal Ideation; SA, Suicide Attempts; SSA, Serious Suicide Attempts; SR, Suicide Risk; SP, Suicide Planning; SB, Suicidal Behaviour; SBT, Suicidal Thoughts and Behaviours; SH, Self-Harm; NSSH, Non-Suicidal Self-Harm; NSSI, Non-Suicidal Self-Injury.

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The association between bullying involvement and SHTB is complex (Kowalski and Limber, 2013). Very few systematic reviews have explored this relationship: two examined demographic characteristics as moderators (Brunstein Klomek et al., 2010; Van Geel et al., 2014), whilst a more recent review explored depression and self-stigma as mediators between bullying victimisation and self-harm (Karanikola et al., 2018). In the meantime, the number of studies examining various potential interactions, moderators, and mediators between bullying involvement and SHTB has been accumulating but has not been the focus of a systematic review. Thus, it is timely to synthesise the worldwide literature, appraise the quality of this research and identify all potential aetiological factors, to increase understanding as to why some individuals involved in bullying are at greater risk of SHTB. This is crucial since bullying is demonstrated to be a common issue among young people who try to end their own life and die by suicide (Brunstein Klomek et al., 2007; Rodway et al., 2016).

At present, there is not a single theory which attempts to explain the multifaceted relationship between bullying involvement and SHTB. Nevertheless, there are many influential theories of suicidal behaviour informing the field. One contemporary theory, supported by empirical research, is the Integrated Motivational-Volitional (IMV) Model of Suicidal Behaviour (O'Connor, 2011; O'Connor and Kirtley, 2018), which encompasses an ideation-to-action framework with an ambition of distinguishing risk and protective factors for suicidal thoughts, intent, and behaviour. The model theorises suicide as a non-linear pathway and suggests that the transition from thoughts to behaviour emerges through pre-motivational, motivational, and volitional influences. Essentially, the model is all-inclusive, incorporating biological, genetic, cognitive, psychological, social, and environmental factors. Still, the purpose of the model is to inspire future researchers and practitioners to improve understanding and better differentiate between individuals who: 1) consider suicide, 2) attempt suicide, and 3) frequently try to end their own life (O'Connor and Nock, 2014).

1.1. Aims and objectives

The aim of this systematic review is to examine interacting, moderating and mediating variables between bullying involvement and SHTB in young people. An interaction is identified as a two-tailed hypothesis, involving two or more independent variables that work together to influence an outcome variable, whereas a moderator is identified as a one-tailed hypothesis, involving a third variable that strengthens or weakens the relationship between an independent variable and an outcome variable (Hall and Sammons, 2013). To our knowledge, this will be the first review to provide a comprehensive synopsis of the extant literature. Moreover, this review will also consider the extent to which previous studies investigating the relationship between bullying involvement and SHTB in young people employ or test a theoretical model.

1.2. Review question

What are the interacting, moderating and mediating variables associated with SHTB in young people involved in traditional bullying and cyber bullying?

2. Methods

2.1. Protocol and registration

A protocol was registered with PROSPERO (CRD42020192023). The systematic review was conducted and reported in accordance with the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) guidelines (Moher et al., 2009) (see Supplementary file 1).

2.2. Information sources

Before undertaking an electronic search, a search strategy was confirmed by a senior research librarian. A search was conducted between 8th – 22nd June 2020, then updated on 21st February 2021, using the following databases without applying limits to the publication year: PubMed/MEDLINE, EMBASE, PsycINFO (Ovid), Cochrane Library, Scopus (Elsevier), Web of Science, ERIC and CINAHL (EBSCOhost). Medical subject headings and free search terms were used (see Supplementary file 2). Reference lists were scanned for relevant studies. Some papers did not contain full information; thus, authors were contacted for further details.

2.3. Inclusion criteria

Participants aged between 11 and 25 years were included to reflect current definitions of adolescence, which incorporate young adulthood up to 25 years (Curtis, 2015). A decision was made to include all populations since peer-reviewed studies which include adolescent participants (e.g., school populations), do not often adjust or stratify for subgroups. There were no restrictions for participant characteristics. Participants involved in bullying as the victim, perpetrator or perpetrator-victim were included; though participants without direct experience of bullying involvement (e.g., bystanders) were excluded.

Full-text peer-reviewed articles written in English language were included if they contained observational studies (i.e., cross-sectional, case-control and longitudinal). Longitudinal studies were also included if bullying involvement and self-harmful thoughts and/or behaviour were measured at the same time or within a timescale of 6 months. Obtainable quantitative data in mixed method studies were included, as well as studies containing secondary data analyses. It was essential that studies had examined one or more of the following bullying roles as a predictor variable: victim, perpetrator and/or perpetrator-victim. Likewise, it was required that studies had examined self-harmful thoughts and/or behaviour (with or without suicide intent) as an outcome variable. Only studies examining a third-variable relationship (i.e., interactions, moderators and/or mediators) were included (refer to protocol for the full inclusion and exclusion criteria: http://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42020192023).

2.4. Study selection and data extraction

As presented in the Prisma Flow Diagram (see Fig. 1), a total of 2994 records were identified through the bibliographic database search. In addition, backward searching was carried out which identified a further 10 records. Following the removal of 1447 duplicates, titles and abstracts of 1557 records were screened for inclusion. Using Rayyan QCRI, HM screened all titles and abstracts and AJW blindly screened 50 %. 131 full-text articles were assessed for eligibility: HM assessed all articles for inclusion, as AJW blindly assessed 50 %. In total, 57 studies were included in the review. A third reviewer was not required in either stage of screening, as disagreements were resolved through consensus. The inter-rater reliability between reviewers was very good (prevalence and bias-adjusted Kappa (PABAK) = 0.88).

Microsoft Excel was used to extract data into a table which was piloted before use (see protocol for extracted information). HM independently extracted data from all eligible studies, whilst AJW extracted data from 25 % of the included studies.

2.5. Quality assessment

Studies were assessed for risk of bias using the Newcastle-Ottawa Scale (NOS) for non-randomised case-control and cohort studies (Peterson et al., 2011; Wells et al., 2012), and the adapted-NOS for cross-sectional studies (Herzog et al., 2013). The scales examine categories

PRISMA 2009 Flow Diagram

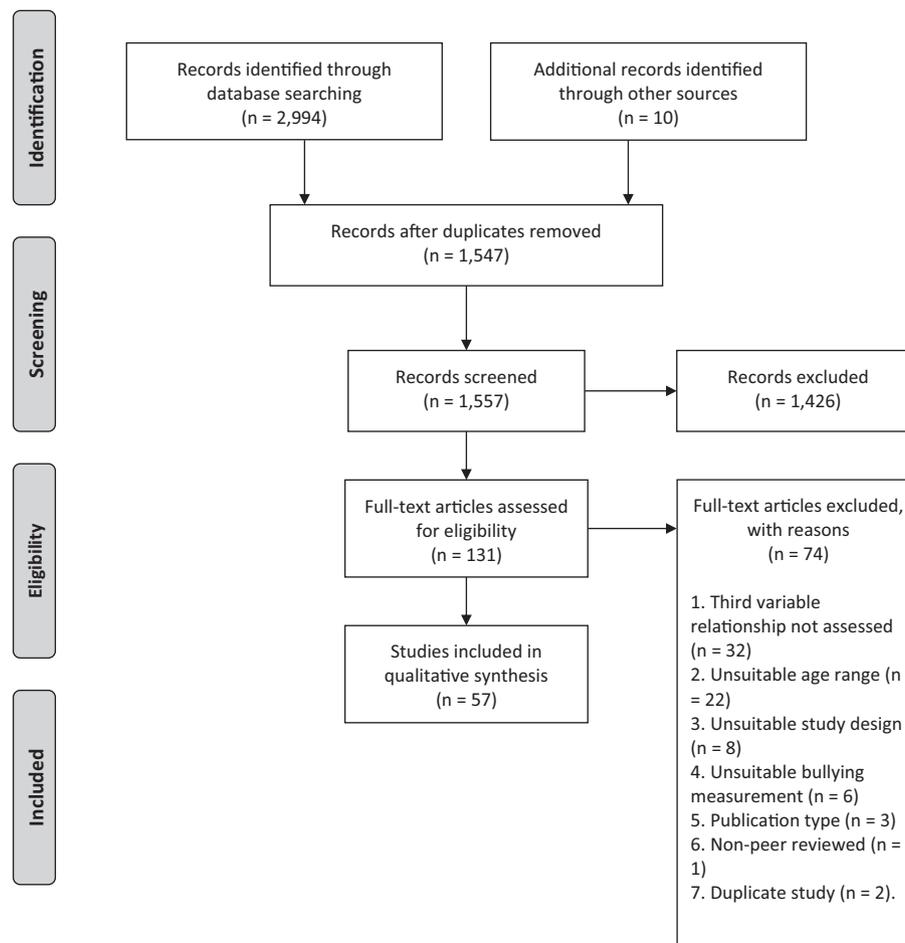


Fig. 1. PRISMA 2009 flow diagram.

including selection, comparability and exposure (case-control), and outcome (cohort/cross-sectional). A star system is used to establish quality: case-control and cohort studies are rated between 0 and 9, whereas cross-sectional studies are rated between 0 and 10 (Rostami et al., 2018). A criterion which defines whether a study is of high quality has not yet been established; therefore, to be coherent with other studies in the field, risk of bias is assessed in a similar approach where studies are classified as having low risk of bias if they achieve ≥ 7 stars (Polihronis et al., 2020; Valencia-Agudo et al., 2018). HM assessed for risk of bias in all included studies, whilst AJW assessed for risk of bias in 25%. Disagreements were resolved through discussion. The inter-rater reliability was moderate (PABAK = 0.57).

2.6. Data synthesis

It was not feasible to conduct a meta-analysis since there was significant heterogeneity among bullying measures, outcome domains, outcome measures and statistical methods. Moreover, there was great diversity amid interactions, moderators, and mediators, and there was a scarcity of replicated studies. Precisely, three distinct designs were repeated, however for each design, there were just two studies. Consequently, a narrative synthesis was implemented, and results are presented descriptively.

Findings are grouped accordingly by outcome (i.e., self-harmful thoughts or self-harmful behaviour), and the context of bullying involvement (traditional, cyber, or combined). Combined bullying

involvement represents studies that have analysed traditional and cyber bullying together. The interacting, moderating and mediating variables are synthesised under the following themes: socio-demographic; depression; parental; personality and psychological; and social and environmental.

3. Results

3.1. Overview of results

Overall, this review included 57 studies. 3 studies identified interactions, 25 studies identified moderators and 31 studies identified mediators between bullying involvement and SHTB in young people. 9 studies identified moderator-mediators.

3.2. Study characteristics

As shown in Tables 1 and 2, studies were conducted across European, Asian and American continents. Many of the included studies were based in the United States (n = 26), whilst others were carried out in China, Spain, Canada, Italy, Portugal, South Korea, Belgium, France, Sweden, and Vietnam. Two papers encompassed the same study, which contained data from 10 European countries (Barzilay et al., 2017; Brunstein Klomek et al., 2016), while another study obtained data across Belgium and the Netherlands (Claes et al., 2015). Most studies embraced a cross-sectional design, except for two longitudinal studies (Jutengren

Table 1
Characteristics of cross-sectional studies included in the systematic review.

Author, year, country	Setting, population	Population characteristics	Bullying involvement	Bullying measure	Outcome	Outcome measure	Theory of SH/ suicide	QA Score
António and Moleiro (2015) Portugal	LGB students	N = 211 Mean age = 17 SD = 1.67 Range = 12–20 N(f) = 55 % (116)	Combined (victimisation)	Self-report: Homophobic Bullying, Speak-out Survey (Stonewall Association, 2007).	SI	Self-report: Reduced version of the Clinical Outcomes in Routine Evaluation-Outcome Measure (Barkham et al., 1998).	No	5
Arango et al. (2016) US	Paediatric emergency department and urgent care	N = 321 Mean age = 13.6 SD = 1.14 Range = 12–15 N(f) = 67 %	Traditional (victimisation and perpetration)	Self-report: Peer Experiences Questionnaire (Prinstein et al., 2001; Vernberg et al., 1999).	SI/SA	Clinical interview: Columbia Suicide- Severity Rating Scale: Screen Version (adapted; Posner et al., 2011).	Yes	7
Baiden et al. (2017) Canada (SDA)	Community and inpatient mental health settings	N = 1650 Mean age = 14.56 SD = 1.79 Range = 12–18 N(m) = 54.2 %	Traditional (victimisation)	Multiple-informant report: interRAI Child and Youth Mental Health dataset (Stewart et al., 2015).	NSSI	Clinical report: Two items enquiring about the history of self-injurious behaviour and intent (Stewart et al., 2015).	No	6
Baldry and Winkel (2003) Italy	School	N = 998 Mean age = 16.04 SD = 1.63 Range = 14–19 N(f) = 43.1 % N(m) = 56.9 %	Traditional (victimisation)	Self-report: Italian modified version (Genta et al., 1996) of the extended bullying questionnaire (Olweus, 1993; Smith and Shu, 2000).	Suicidal Cognition	Self-report: Two items taken from the internalizing subscale (Italian version; Frigerio, 1998) of the Child Behavioural Check List (Achenbach and Edelbrock, 1983).	No	7
Bao et al. (2020) China	School	N = 2360 Mean age = 14.86 SD = 1.83 Range = NR Grade = 7–12 N(f) = 52.08 % (1212) N(m) = 47.92 % (1115)	Traditional (victimisation)	Self-report: A global question, including a definition obtained from the Health Behaviour in School-aged Children study (Beckman et al., 2012).	SI	Self-report: A global question used in previous studies (Barzilay et al., 2017; Borowsky et al., 2013).	Yes	4
Barzilay et al. (2017) (SEYLE Study) 10 EU countries	School	N = 11,110 Mean age = 14.9 SD = 0.89 Range = 14–15.8 N(f) = NR	Traditional (victimisation)	Self-report: Global School-Based Student Health Survey (World Health Organization).	SI/SA	Self-report: Two items from the Paykel Hierarchical Suicidal Ladder (Paykel et al., 1974).	No	6
Bauman et al. (2013) US (SDA)	School	N = 1491 Mean age = NR SD = NR Range = NR Grade = 9–12 N(f) = 49 %	Traditional and cyber (victimisation and perpetration)	Self-report: Four items from the 2009 Arizona Youth Risk Behaviour Survey (Centers for Disease Control and Prevention, 2009).	SA	Self-report: Three items from the 2009 Arizona Youth Risk Behaviour Survey (Centers for Disease Control and Prevention, 2009).	Yes	4
Bonanno and Hymel (2010) Canada	School	N = 399 Mean age = 14.2 SD = 0.91 Range = NR Grade = 8–10 N(f) = 228 N(m) = 171	Combined (victimisation)	Self-report: The Bullying Questionnaire containing thirty-two items (developed by the authors).	SI	Self-report: The Suicidal Ideation Questionnaire-JR (Reynolds, 1987).	Yes	3
Brunstein Klomek et al. (2016) (SEYLE Study) 10 EU countries	School	N = 11,110 Mean age = 14.9, SD = 0.89 Range = 14–15.8 N(f) = NR	Traditional (victimisation)	Self-report: Ten yes/no items.	SH	Self-report: Six item questionnaire enquiring about intentional self-injurious behaviour (Brunner et al., 2014).	No	4
Cardoso et al. (2018) US	School	N = 534 Mean age = 14.44 SD = 2.23 Range = NR N(f) = 56.2 % (300)	Traditional (victimisation)	Self-report: Ten items from the California Healthy Kids Survey (WestEd, 2015).	SI	Self-report: Two items enquiring about the consideration of suicide and plans.	No	6
Cénat et al. (2019) France	Under graduates	N = 4626 Mean age = 20.08 SD = 1.29	Cyber (victimisation)	Self-report: Two item questionnaire (Litwiller and Brausch, 2013).	Suicidality	Self-report: Two items assessing suicidal ideation and suicide attempts (Statistics Canada, 2007).	No	6

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Table 1 (continued)

Author, year, country	Setting, population	Population characteristics	Bullying involvement	Bullying measure	Outcome	Outcome measure	Theory of SH/ suicide	QA Score
Chang et al. (2019) China (SDA)	School	Range = 15–23 N(m) = 920 N = 3522 Mean age = 15.26 SD = 1.93 Range = 11–22 Grade = 7–12 N(f) = 43.8 % (1544) N(m) = 56.2 % (1978)	Cyber (victimisation)	Self-report: One item, including data from the 2016 Youth Sexuality Study.	SI	Self-report: One item enquiring about the serious consideration of suicide.	No	4
Claes et al. (2015) Belgium and the Netherlands	School	N = 785 Mean age = 15.56 SD = 1.32 Range = 12–19 Grade = 7–12 N(f) = 44.5 % (349) N(m) = 55.5 % (436)	Traditional (victimisation and perpetration)	Self-report: Bully/Victim Self-Report Questionnaire (Olweus, 1991).	NSSI	Self-report: Self-Harm Inventory (Sansone et al., 1998) without suicidal intent.	No	6
Dempsey et al. (2011) US (SDA)	School	N = 1352 Mean age = 14.26 SD = 1.88 Range = 11–17 Grade = 6–11 N(f) = 53.1 %	Traditional (victimisation)	Self-report: Child Social Experience Questionnaire (Crick and Grotpeter, 1995).	Suicidality	Self-report: Two items assessing suicidal thoughts and attempts.	No	6
Duong and Bradshaw (2014) US (SDA)	School LGB youth	N = 951 Mean age = NR SD = NR Range = 12–18 Grade = 9–12 N(f) = 69.5 %	Traditional, cyber, and combined (victimisation)	Self-report: Two items from the 2009 Youth Risk Behaviour Survey.	SA/SSA	Self-report: Two items from the 2009 Youth Risk Behaviour Survey enquiring about suicide attempts.	No	5
Esposito et al. (2019) Italy	School	N = 640 Mean age = 15.60 SD = 1.65 Range = 13–17 N(m) = 253	Traditional (victimisation and perpetration)	Self-report: Adapted version of the Bully/Victim Questionnaire (Olweus, 1996).	NSSI	Self-report: Six item scale (Giletta et al., 2012; Prinstein et al., 2008) assessing self-injurious behaviour without suicidal intent.	Yes	5
Extremera et al. (2018) Spain	School	N = 1660 Mean age = 14.10 SD = 1.54 Range = 12–18 N(f) = 50.4 %	Cyber (victimisation)	Self-report: Cyber victimisation subscale of the European Cyberbullying Intervention Project Questionnaire, (Brighi et al., 2012).	SR	Self-report: Suicidal Behaviours Questionnaire–Revised (Osman et al., 2001).	No	6
Fredrick and Demaray (2018) US	School	N = 403 Mean age = NR SD = NR Range = 13–16 Grade = 9th N(f) = 50 % (203) N(m) 49 % (199)	Traditional and cyber (victimisation)	Self-report: Revised Olweus Bully/Victim Questionnaire (Olweus, 1996) and Cyberbullying and Victimization Survey (Brown et al., 2014).	SI	Self-report: Suicidal Ideation Questionnaire–Junior Version (Reynolds, 1987).	Yes	4
Gower and Borowsky (2013) US (SDA)	School	N = 128,681 Mean age = NR SD = NR Grade = 6th, 9th, 12th N(f) = 50.3 %	Traditional (victimisation and perpetration)	Self-report: Two items, data taken from the 2010 Minnesota Student Survey.	SI/SH/SA	Self-report: Three items enquiring about self-directed violence, adapted from the 2009 Youth Risk Behaviour Survey (Centers for Disease Control and Prevention, 2009).	No	3
Hatchel et al. (2019) US (SDA)	School LGBTQ youth	N = 934 Mean age = 15.91 SD = 1.18 Range = 14–18 N(assigned f) = 70.2 %	Traditional (victimisation)	Self-report: University of Illinois Victimization Scale (Espelage et al., 2003).	SI/SA	Self-report: Two items enquiring about serious thoughts of suicide and attempts.	Yes	7
Henry et al. (2014) US	School	N = 2936 Mean age = NR SD = NR Range = 11–18	Combined (victimisation)	Self-report: Measures developed by the Multisite Violence	SI	Self-report: Four-item scale enquiring about the frequency of suicidal ideation (Lewinsohn et al., 1996).	Yes	7

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Table 1 (continued)

Author, year, country	Setting, population	Population characteristics	Bullying involvement	Bullying measure	Outcome	Outcome measure	Theory of SH/suicide	QA Score
Hirschtritt et al. (2015) US (SDA)	School	Grade = 6–12 N(f) = 50 % N = 42,594 Mean age = NR SD = NR Range = NR Grade = 9th, 11th N(f) = 55.2 %	Traditional and cyber (victimisation)	Prevention Project (2004). Self-report: Five items, including data from the California Healthy Kids Survey (CHKS).	SI	Self-report: One item enquiring about the serious consideration of suicide.	No	3
Hong et al. (2020) US	School	N = 638 Mean age = 15.8 SD = 1.41 Range = 13–24 N(f) = 54.4 % (346) N(m) = 45.5 % (290)	Traditional (victimisation)	Self-report: University of Illinois Victimization Scale (Espelage and Holt, 2001).	SI	Self-report: One item enquiring about suicidal thoughts.	No	7
Iranzo et al. (2019) Spain	School	N = 1062 Mean age = 14.51 SD = 1.62 Range = 12–18 Grade = 7–12 N(f) = 48.5 % (515) N(m) = 51.5 % (547)	Cyber (victimisation)	Self-report: Adolescent Victimization through Mobile Phone and Internet Scale (Buelga et al., 2010; Buelga et al., 2012).	SI	Self-report: Suicide Ideation Scale (Marino et al., 1993).	Yes	4
Jones et al. (2014) US	Inpatient psychiatric setting	N = 67 Mean age = 15.33 SD = 1.40 Range = 13–17 N(f) = 40 N(m) = 27	Traditional (victimisation)	Self-report: Bully Victimization Scale (Reynolds, 2003).	SI	Self-report: Inventory of Suicide Orientation-30 (King and Kowalchuk, 1994).	No	6
Kim et al. (2018) US (SDA)	School	N = 11,341 Mean age = NR SD = NR Range = 14–18 Grade = 9–12 N(f) = 50.9 % (5770) N(m) = 49.1 % (5571)	Traditional and cyber (victimisation)	Self-report: Two items, including data from the 2015 Youth Risk Behaviour Surveillance System (Centers for Disease Control and Prevention, 2017).	SA	Self-report: One item enquiring about suicide attempts.	No	4
Kim et al. (2020) South Korea (SDA)	School	N = 7412 Mean age = NR SD = NR Range = NR Grade = 7–12 N(f) = 42.3 % (3132)	Traditional and cyber (victimisation)	Self-report: Six items measuring traditional bullying victimisation (Agnew et al., 2002; Hay and Meldrum, 2010; Kim et al., 2018) and four items measuring cyber victimisation (Hay and Meldrum, 2010; Hinduja and Patchin, 2009).	SI	Self-report: One item enquiring about suicidal thoughts (Hay and Meldrum, 2010; Prince et al., 1999).	Yes	5
Kodish et al. (2016) US	Paediatric Primary Care	N = 5429 Mean age = 16.77 SD = 2.5 Range = 14–24 N(f) = 56.5 %	Traditional and cyber (victimisation)	Self-report: Three items from the Behavioural Health Screen.	SR	Self-report: Four items from the lifetime suicide scale (Bevans et al., 2012).	No	3
Li and Shi (2018) US (SDA)	School	N = 1586 Mean age = NR SD = NR Range = 15–17 Grade = 9–12 N(m) = 50.47 %	Combined (victimisation)	Self-report: Two items, including data from the 2015 California Youth Risk Behaviour Survey.	Suicide	Self-report: Three items enquiring about suicidal thoughts, planning, and attempts.	No	7
Litwiller and Brausch (2013) US (SDA)	School	N = 4693 Mean age = 16.11 SD = 1.2 Range = 14–19 N(f) = 47 % N(m) = 47 %	Traditional and cyber (victimisation)	Self-report: Six items, including data from the Youth Risk Behaviour Survey (Centers for Disease Control and Prevention, 2008).	SB	Self-report: Four items assessing suicidal ideation and behaviours, including data from the Youth Risk Behaviour Survey (Centers for Disease Control and Prevention, 2008).	Yes	6
Liu et al. (2013) China	School	N = 962 Mean age = 13.2 SD = 0.9	Traditional (victimisation)	Self-report: Chinese version of the Olweus Bully/Victim	SI	Self-report: Chinese version of the Positive and Negative Suicide Ideation inventory.	No	5

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Table 1 (continued)

Author, year, country	Setting, population	Population characteristics	Bullying involvement	Bullying measure	Outcome	Outcome measure	Theory of SH/ suicide	QA Score
Liu et al. (2017) China	School	Range = 11–16 Grade = 7–8 N(f) = 406 N(m) = 556 N = 946 Mean age = 13.18 SD = 0.9	Traditional (victimisation)	Questionnaire (Zhang et al., 1999). Self-report: Chinese version of the Olweus Bully/Victim Questionnaire.	SI	Self-report: Chinese version of the Positive and Negative Suicidal Ideation Questionnaire (Osman et al., 2002; Wang et al., 2011).	No	7
Lucas-Molina et al. (2018) Spain	School	Range = 11–16 Grade = 7–8 N(f) = 402 N(m) = 544 N = 1664 Mean age = 16.12 SD = 1.36	Cyber (victimisation)	Self-report: Brief Cyberbullying Questionnaire (Ortega et al., 2007).	SI	Self-report: Paykel suicide scale (Paykel et al., 1974).	Yes	5
Min et al. (2015) South Korea	School	Range = 14–19 N(f) = 53 % (882) N = 1198 Mean age = NR SD = NR Range = 12–13 Grade = 7–8 N(f) = 66.9 % (801) N(m) = 33.1 % (397)	Traditional (victimisation and perpetration)	Self-report: Edited version of Olweus' (1996) Bully-Victim Questionnaire.	SI	Self-report: Scale for Suicidal Ideation and the revised Korean version (Shin et al., 1990; You, 2008).	No	5
Moon et al. (2015) US (SDA)	School	Range = 12–13 Grade = 7–8 N(f) = 66.9 % (801) N(m) = 33.1 % (397) N = 15,425 Mean age = 16.1 SD = 1.24 Range = 12–18 Grade = 9–12 N(f) = 50.2 % (7708) N(m) = 49.8 % (7656)	Traditional (victimisation)	Self-report: Three items, including data from the 2011 Youth Risk Behaviour Survey.	SB	Self-report: Four items enquiring about the consideration of suicide or planning.	Yes	5
Nguyen et al. (2020) Vietnam (SDA)	School	Range = 9–12 N(f) = 50.2 % (7708) N(m) = 49.8 % (7656) N = 648 Mean age = NR SD = NR Range = 11 years Grade = 6th grade N(f) = 47.7 % (309) N(m) = 52.3 % (339)	Cyber (victimisation)	Interview: Six items, including some from an original scale (Hinduja and Patchin, 2010).	SP/SH	Interview: Four items assessing suicidal ideation, planning, attempts and self-harm (Youth Risk Behaviour Survey).	No	7
Peng et al. (2020) China	School	Range = 12–18 Grade = 9–12 N(f) = 50.2 % (7708) N(m) = 49.8 % (7656) N = 795 Mean age = 14.41 SD = 1.70	Traditional (victimisation)	Self-report: Adolescent Peer Victimization Questionnaire (Li et al., 2017).	SI/SA	Self-report: Two items assessing suicidal ideation and attempts.	Yes	7
Quintana-Orts and Rey (2018) Spain	School	Range = 11–19 N(f) = 442 N(m) = 353 N = 1044 Mean age = 13.09 SD = 0.77	Traditional and cyber (victimisation)	Self-report: The European Bullying Intervention Project Questionnaire and the European Cyberbullying Intervention Project Questionnaire (Ortega-Ruiz et al., 2016).	SR	Self-report: The Suicidal Behaviours Questionnaire-Revised (Osman et al., 2001).	Yes	7
Quintana-Orts et al. (2020) Spain	School	Range = 12–14 N(f) = 527 N(m) = 517 N = 1821 Mean age = 14.53 SD = 1.67	Cyber (victimisation)	Self-report: Cyber victimisation subscale from the European Cyberbullying Intervention Project Questionnaire (Brighi et al., 2012; Ortega-Ruiz et al., 2016).	SI	Self-report: Frequency of Suicidal Ideation Inventory-Spanish version (Chang and Chang, 2016; Sánchez-Álvarez et al., 2020).	No	6
Reed et al. (2015) US (SDA)	School	Range = 12–17 N(f) = 954 N(m) = 867 N = 15,425 Mean age = 16.1 SD = 1.24 Grade = 9–12 N(f) = 50 %	Traditional and cyber (victimisation)	Self-report: Two items, including data from the 2011 Youth Risk Behaviour Surveillance Survey (Centers for	SI/SA	Self-report: Three items, including data from the 2011 Youth Risk Behaviour Surveillance Survey (Centers for	Yes	4

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Table 1 (continued)

Author, year, country	Setting, population	Population characteristics	Bullying involvement	Bullying measure	Outcome	Outcome measure	Theory of SH/ suicide	QA Score
Rey et al. (2019)	Spain	School N = 1617 Mean age = 14.02 SD = 1.46 Range = 12–17 N(f) = 50.5 % (817) N(m) = 49.5 % (800)	Traditional (victimisation)	Disease Control and Prevention, 2011). Self-report: Victimization subscale of the European Bullying Intervention Project Questionnaire-Spanish version (Brighi et al., 2012; Ortega-Ruiz et al., 2016).	SR	Disease Control and Prevention, 2011). Self-report: Suicidal Behaviours Questionnaire-Revised (Osman et al., 2001).	No	6
Rodelli et al. (2018)	Belgium	School N = 1037 Mean age = 15.17 SD = 1.86 Range = 12–18 Grade = 7–12 N(f) = 49.8 % N(m) = 50.2 %	Cyber (victimisation and perpetration)	Self-report: Three items measuring cyber bullying involvement (Solberg and Olweus, 2003).	SI	Self-report: One item assessing suicidal thoughts.	Yes	3
Sampasa-Kanyinga et al. (2014)	Canada (SDA)	School N = 2999 Mean age = 14.3 SD = 1.8 Range = 11–20 Grade = 7–12 N(f) = 55.3 % (1658) N(m) = 44.7 % (1341)	Traditional and cyber (victimisation)	Self-report: Two items, including data from the Eastern Ontario Youth Risk Behaviour Survey (Centers for Disease Control and Prevention, 2009).	SI/SP/SA	Self-report: Three items assessing suicidal ideation, plans and attempts, taken from the 2009 Youth Risk Behaviour Survey (Centers for Disease Control and Prevention, 2009).	Yes	6
Sampasa-Kanyinga et al. (2020)	Canada (SDA)	School N = 5478 Mean age = 15.19 SD = 1.82 Range = 11–20 Grade = 7–12 N(f) = 47.83 % (3009) N(m) = 52.17 % (2469)	Cyber (victimisation)	Self-report: One item adapted from World Health Organization's Health Behaviour of School-aged Children study (Boak et al., 2013).	SI/SA	Self-report: Two items assessing suicidal ideation and attempts, taken from the Youth Risk Behaviour Survey.	No	6
Stewart et al. (2018)	US	Acute psychiatric treatment program N = 340 Mean age = 15.59 SD = 1.41 Range = 13–19 N(f) = 72.14 % (246)	Traditional (victimisation)	Self-report: Revised Peer Experiences Questionnaire (Prinstein et al., 2001).	SP/SA	Structured interview: Self-Injurious Thoughts and Behaviours Interview (Nock et al., 2007).	Yes	5
Turpin et al. (2019)	US (SDA)	School, sexual minority N = 924 Median = 16 years Range = 14–18 Grade = 9–12 N(f) = 75.4 % N(m) = 24.6 %	Traditional (victimisation)	Self-report: One item, including data from the 2015 Youth Risk Behaviour Survey (Centers for Disease Control and Prevention, 2015).	SP	Self-report: One item assessing suicide planning.	No	6
Wang et al. (2018)	US (SDA)	School N = 12,511 Mean age = NR SD = NR Grade = 6–8 N(f) = 50.05 % (6262) N(m) = 49.95 % (6249)	Traditional and cyber (victimisation)	Self-report: Three items assessing cyber victimisation and four items assessing traditional victimisation, including data from the Georgia Student Health Survey 2.0.	STB	Self-report: Four-item Suicidal Thoughts and Behaviour Scale.	No	4
Wang et al. (2019)	US (SDA)	School N = 301,628 Mean age = NR SD = NR Grade = 6–8 N(f) = 50.7 %	Traditional and cyber (victimisation)	Self-report: Seven item scale, including data from the Georgia Student Health Survey 2.0 (Georgia Department of Education, 2017).	STB	Self-report: Four-item Suicidal Thoughts and Behaviour Scale.	No	4
Williams et al. (2017)	US	Acute adolescent psychiatric unit N = 80 Mean age = 15.16 SD = 1.35 Range = 13–18 N(f) = 66.3 %	Traditional (victimisation)	Self-report: Peer victimisation scale from the Revised Peer Experiences Questionnaire (Prinstein et al., 2001).	SI	Structured Interview: The Suicidal Ideation Questionnaire (Reynolds, 1985).	No	4
					SI		Yes	4

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Table 1 (continued)

Author, year, country	Setting, population	Population characteristics	Bullying involvement	Bullying measure	Outcome	Outcome measure	Theory of SH/ suicide	QA Score
Wolff et al. (2014) US	Psychiatric inpatient facility	N = 183 Mean age = 15.02 SD = 1.32 Range = 13–18 N(f) = 71.6 %	Traditional (victimisation)	Self-report: The Revised Peer Experiences Screening Questionnaire (Vernberg et al., 1999).		Self-report: The Suicide Ideation Questionnaire (Reynolds, 1985).		
Wright (2016) US	Residential program	N = 93 Mean age = 14.03 SD = 0.51 Range = 13–16 Grade = 7–8 N(m) = 93	Traditional (victimisation and perpetration)	Self-report: Two subscales on perpetration and victimisation by bullying (Wright et al., 2014).	NSSH/SI	Self-report: Self-Harm Inventory (Sansone et al., 1998) and a scale assessing the frequency of suicidal thoughts (Reynolds, 1991).	No	4
Xavier et al. (2016) Portugal	School	N = 854 Mean age = 14.89 SD = 1.79 Range = 12–18 Grade = 7–12 N(f) = 52.8 % (451) N(m) = 47.2 % (403)	Traditional (victimisation)	Self-report: The Peer Relations Questionnaire (Rigby and Slee, 1993; Silva and Pinheiro, 2010).	NSSI	Self-report: Risk-taking and Self-harm Inventory for Adolescents (Vrouva et al., 2010; Xavier et al., 2013).	Yes	5
Xiong et al. (2019) China	Left-behind children	N = 194 Mean age = 13.51 SD = 1.03 Range = 12–16 Grade = 9–12 N(f) = 49 % (95) N(m) = 46.4 % (90)	Traditional (victimisation)	Self-report: Eighteen-item questionnaire (Mynard and Joseph, 2000; Guo et al., 2017).	SH	Self-report: Deliberate Self-Harm Inventory (Gratz, 2001; Lundh et al., 2007).	No	4
Yang et al. (2020) China	School	N = 23,392 Mean age = 15.2 SD = 1.9 Range = 12–19 N(f) = 54.6 % (12,767) N(m) = 45.4 % (10,625)	Traditional (victimisation and perpetration)	Self-report: Twelve items adapted from a previous study (Kaltiala-Heino et al., 1999).	SI/SA	Self-report: Two items assessing suicidal ideation and attempts (Guo et al., 2017; Zwald et al., 2018).	No	8
Yu et al. (2020) China	School	N = 1006 Mean age = 13.16 SD = 0.67 Range = 12–15 N(f) = 51.78 % (521)	Cyber (victimisation)	Self-report: Cyberbullying Victimization Scale (Erdur-Baker, 2007).	NSSI	Self-report: Non-Suicidal Self-Injury Scale (You et al., 2013).	Yes	7

SDA: Secondary data analysis; SI: suicidal ideation; SA: suicide attempts; SSA: serious suicide attempts; SB: suicidal behaviour; STB: suicidal thoughts and behaviours; SP: suicide planning; SR: suicide risk; NSSI: non-suicidal self-injury; NSSH: non-suicidal self-harm; SH: self-harm.

et al., 2011; Roeder and Cole, 2018). Numerous studies employed cross-sectional secondary data analyses ($n = 22$).

3.3. Research design

Two longitudinal studies shared a two-wave design, with one study comprising a 4-month follow-up (Roeder and Cole, 2018) and the other comprising a 12-month follow-up (Jutengren et al., 2011).

3.4. Sample characteristics

Referring to cross-sectional studies ($n = 55$), analytical sample sizes ranged from 67 to 301,628 ($M = 11,702$, $SD = 43,802$). Most ($n = 49$) studies contained sample sizes over 300 participants. The age of participants ranged from 11 to 24 years. Using the available data ($n = 39$), the mean age of participants was calculated ($M = 15.02$, $SD = 1.43$). Using the available data ($n = 29$) it was revealed that males were under-represented in most studies ($n = 21$): the ratio of males to every 100

females ranged between 16.89 and 136.95. Forty-two studies contained school-based samples, whilst five studies reflected psychiatrically-referred samples. Other study samples included: undergraduates (Cénat et al., 2019), left-behind children (Xiong et al., 2019), and Lesbian, Gay, Bisexual, Transgender and Questioning (LGBTQ) students (António and Moleiro, 2015; Duong and Bradshaw, 2014; Hatchel et al., 2019), paediatric emergency services and primary care (Arango et al., 2016; Kodish et al., 2016), and a residential program offering therapeutic treatment (Wright, 2016).

Referring to longitudinal studies, the mean sample size was 404 ($SD = 412$), whilst the mean age of participants was 16.5 years ($SD = 2.95$). Roeder and Cole's (2018) study contained two analytical samples, but males were under-represented in both. In contrast, males were marginally over-represented in Jutengren et al.'s (2011) study. Both studies contained school samples, whilst Roeder and Cole's (2018) second sample consisted of university students.

Table 2
Characteristics of longitudinal studies included in the systematic review.

Author, year, country	Setting, population	Population characteristics	Bullying involvement	Bullying measure	Outcome	Outcome measure	Theory of SH/ suicide	QA Score
Jutengren et al. (2011) Sweden	School	N = 880 Mean age = 13.72 SD = 0.78 Range = 13–15 Grade = 7–8 N(f) = 435 N(m) = 445 Waves = T1, T2 Follow up = 1 year	Traditional (victimisation)	Self-report: Two scales, five items measuring harassment and three items measuring bullying (Alsaker and Brunner, 1999).	SH	Self-report: Deliberate self-harm inventory, revised version (Gratz, 2001; Lundh et al., 2007).	Yes	4
Roeder and Cole (2018) US	School and under graduates	N1 = 192 Mean age = 16.20 SD = 1.04 N1(f) = 62 % N2 = 142 Mean age = 19.60 SD = 1.06 N2(f) = 78 % Waves = T1, T2 Follow up = 4 months	Combined (victimisation)	Self-report: Peer Victimization Self-Report (Cole et al., 2010) and eight items adapted from the Negative Acts questionnaire (Einarsen et al., 2009) and the Cyberbullying Experiences Survey (Doane et al., 2013).	SI	Self-report: Suicidal Ideation Questionnaire-Jr. (Reynolds, 1988).	Yes	5

SH: self-harm; SI: suicidal ideation.

3.5. Predictor variables

Twenty-nine studies assessed only traditional bullying, whereas ten studies assessed only cyber bullying. Eighteen studies assessed both traditional and cyber bullying: thirteen of these performed separate analyses for traditional and cyber bullying, whereas five studies combined traditional and cyber bullying within analyses.

There was considerable heterogeneity among measures used to assess bullying involvement (see Tables 1 and 2). Most studies collected data via self-report, except for two studies which used a clinician report (Baiden et al., 2017), and a structured interview (Nguyen et al., 2020).

3.6. Outcome variables

As shown in Tables 1 and 2, outcome variables and measures differed substantially across studies. Some studies measured single outcomes, including suicidal ideation (SI) ($n = 22$); self-harming behaviour, specifically non-suicidal self-injury (NSSI) ($n = 5$) and self-harm (SH) ($n = 3$); suicide risk (SR) ($n = 4$); suicidal thoughts and behaviour (STB) ($n = 2$); suicidality ($n = 3$); suicidal behaviour (SB) ($n = 2$); suicide attempts (SA) ($n = 3$); and suicide planning (SP) ($n = 1$). Other studies measured two or more of these or combined the outcomes ($n = 11$). Most outcomes were measured using self-reports. Three studies used structured interviews and one study used a clinical report.

3.7. Theoretical frameworks

Twenty-four studies cited theories of self-harm/suicide. Examples of these included Interpersonal-Psychological Theory of Suicidal Behaviour (Joiner, 2005), Hopelessness Theory of Suicide (Beck, 1967), Escape Theory of Suicide (Baumeister, 1990) and others. Surprisingly, no studies mentioned or tested the IMV model (O'Connor, 2011; O'Connor and Kirtley, 2018).

3.8. Quality assessment

As shown in Tables 1 and 2, the quality of studies varied significantly. Just twelve studies were rated low risk of bias. Referring to cross-sectional studies, the reasons for bias attributing to the lower ratings included: no description of sampling strategy, or biased sampling strategy used ($n = 21$); unjustified and unsatisfactory sample size ($n =$

51); no description of response rate, or an unsatisfactory response rate ($n = 44$); non-validated measurement tool used ($n = 24$); or non-adjustments for confounding factors ($n = 24$).

Referring to longitudinal studies, the reasons for bias attributing to the lower ratings included: no description of sampling strategy; assessment used for ascertainment of exposure was deemed unsatisfactory; no demonstration that the outcome was not present at the start of the study; assessment of outcome was deemed unsatisfactory; follow-ups were not long enough for outcomes to occur, or the adequacy of follow-ups were not described (see Supplementary file 2 for quality assessment tables).

3.9. The relationship between bullying involvement and self-harmful thoughts

3.9.1. Socio-demographic

3.9.1.1. Traditional bullying involvement. As illustrated in Table 3, some studies have examined gender as a moderator between victimisation and self-harmful thoughts, however, inconsistent findings exist. One study examined gender as a moderator between different types of victimisation (verbal, physical and relational) and SI: only verbal victimisation and SI was moderated by gender, and this association was stronger for male adolescents (Arango et al., 2016). Similarly, interaction effects of types of victimisation (direct and relational) and gender were assessed in a school sample, however, no interactions were found (Baldry and Winkel, 2003). Another school study revealed that gender did not moderate the association between victimisation and SI (Lucas-Molina et al., 2018). Interestingly, one study discovered that gender and grade jointly moderated victimisation on SI in school children (Gower and Borowsky, 2013).

With regard to bullying perpetration, one study revealed that gender moderated the relationship between perpetration and SI: there was an elevated risk in schoolgirls (Gower and Borowsky, 2013). In contrast, one study consisting of a community sample, assessed gender as a moderator between different types of perpetration (verbal, physical and relational) and SI, but no interactions were found (Arango et al., 2016).

Studies have examined sex/biological gender (we are using the term biological gender to mean sex) as a moderator between victimisation and SI, however, the findings are inconsistent. One study showed that biological gender moderated victimisation and SI in a school sample: the

Table 3
Summary of interacting, moderating and mediating variables associated with self-harmful thoughts.

	Author (year)	Outcome	Timespan	Interactions	Moderators	Mediators
<i>Face-to-face Involvement</i>	Arango et al. (2016)	SI	Past 2 weeks	N.A	1. Verbal victimisation × gender** 2. Victimization (relational, physical) × gender (ns) 3. Perpetration types × gender (ns) 4. Victimization types × social connectedness (ns) Perpetration types × social connectedness (ns)	N.A
	Baldry and Winkel (2003)	Suicide Cognition	Past 6 months	1. Direct victimisation × gender (ns) 2. Relational victimisation × gender (ns)	N.A	N.A
	Bao et al. (2020)	SI	Lifetime	N.A	N.A	1. Victimization > psychological pain (f) (middle school) 1.1. Peer support (moderated mediation) (ns) 1.2. Family togetherness (moderated mediation) 2. Victimization > psychological pain (p)** (high school) 2.1. Peer support (moderated mediation) 2.2. Family togetherness (moderated mediation) (ns)
	Barzilay et al. (2017) (SEYLE study)	SI	Past 2 weeks	N.A	1. Victimization × depression (ns) 2. Victimization × anxiety (ns) 3. Verbal victimisation × parental support* 4. Physical victimisation × parental support (ns) 5. Relational victimisation × parental support (ns) 6. Verbal victimisation × peer support* 7. Physical victimisation × peer support (ns) 8. Relational victimisation × peer support (ns) 9. Verbal victimisation × depression × parental support*	N.A
	Cardoso et al. (2018)	SI	Past 12 months	N.A	N.A	1. General victimisation > depression (ns) 2. Verbal/relational victimisation > depression* 3. Physical victimisation > depression (ns) 4. Ethnic-based victimisation > depression*
	Fredrick and Demaray (2018)	SI	Past month	N.A	N.A	1. Victimization > depressive symptoms** 2. Gender (moderated mediation) (ns)
	Gower and Borowsky (2013) (SDA)	SI	Past year	N.A	1. Victimization × gender × grade*** 2. Perpetration × gender*** 3. Perpetration × grade***	N.A
	Hatchel et al. (2019) (SDA)	SI	Past 30 days	N.A	N.A	1. Victimization > self-compassion (ns) 2. Victimization > school belongingness
	Hirschtritt et al. (2015) (SDA)	SI	Past 12 months	N.A	1. Verbal victimisation × internal resilience** 2. Physical victimisation × internal resilience (ns) 3. Relational victimisation × internal resilience (ns) 4. Frequency of victimisation × internal resilience (ns) 5. Type of victimisation × sex (ns)	N.A

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Table 3 (continued)

Author (year)	Outcome	Timespan	Interactions	Moderators	Mediators
Hong et al. (2020)	SI	Past 7 days	N.A	6. Frequency of victimisation × sex (ns) Victimisation × positive future orientation***	N.A
Jones et al. (2014)	SI	NR	N.A	N.A	Victimisation > negative self-esteem (f)
Kim et al. (2020) (SDA)	SI	Past year	N.A	N.A	1. Victimisation > negative emotions*** (p) 1.1 Self-esteem (moderated mediation)
Liu et al. (2013)	SI	NR	N.A	Victimisation × forgiveness*	N.A
Liu et al. (2017)	SI	NR	N.A	Victimisation × perceived social support***	Victimisation > perceived social support***(p)
Lucas-Molina et al. (2018)	SI	Past year	N.A	Victimisation × gender (ns)	1. Victimisation > subjective wellbeing 1.1. Gender (moderated mediation) 1.2. Subjective wellbeing × gender (moderated mediation) (ns)
Min et al. (2015)	SI	NR	N.A	N.A	1. Victimisation > depressive symptoms** (females) 2. Perpetration > depressive symptoms (ns)
Peng et al. (2020)	SI	Past 6 months	N.A	N.A	1. Victimisation > psychological security (p) 1.1. Family functioning × gender (moderated mediation)
Reed et al. (2015) (SDA)	SI	Past 12 months	N.A	N.A	Victimisation > depression
Sampasa-Kanyinga et al. (2014) (SDA)	SI	Past 12 months	N.A	N.A	Victimisation > depression (p)
Williams et al. (2017)	SI	Past month	N.A	N.A	Victimisation > interpersonal rejection sensitivity**
Wolff et al. (2014)	SI	Past month	N.A	1. Victimisation × family support (ns) 2. Victimisation × friend support (ns) 3. Victimisation × negative self-talk*** 4. Victimisation × cognitive errors**	N.A
Wright (2016)	SI	NR	N.A	1. Victimisation × parental warmth* 2. Perpetration × parental warmth (ns)	N.A
Yang et al. (2020)	SI	Past 12 months	N.A	1. Victimisation × biological gender 2. Perpetration × biological gender 3. Perpetration-victimisation × biological gender (ns)	N.A
Cyber Involvement Chang et al. (2019) (SDA)	SI	Past year	N.A	N.A	1. Cyber victimisation > life satisfaction (p) (overall) 2. Cyber victimisation > life satisfaction (p) (family) 3. Cyber victimisation > life satisfaction (p) (classmates) 4. Cyber victimisation > life satisfaction (p) (academic results)
Fredrick and Demaray (2018)	SI	Past month	N.A	N.A	1. Cyber victimisation > depressive symptoms** 1.1. Gender (moderated mediation) (ns)
Hirschtritt et al. (2015) (SDA)	SI	Past 12 months	N.A	Cyber victimisation × internal resilience (ns)	N.A
Iranzo et al. (2019)	SI	Past 7 days	N.A	N.A	1. Cyber victimisation > perceived stress 2. Cyber victimisation > loneliness 3. Cyber victimisation > depressive symptomatology 4. Cyber victimisation > psychological distress
	SI	Past year	N.A	N.A	

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Table 3 (continued)

Author (year)	Outcome	Timespan	Interactions	Moderators	Mediators
Kim et al. (2020) (SDA)					1. Cyber victimisation > negative emotions*** (p) 1.1. Self-esteem (moderated mediation)
Lucas-Molina et al. (2018)	SI	Past year	N.A	Cyber victimisation × gender (ns)	1. Cyber victimisation (mobile) > subjective well being 1.1. Gender (moderated mediation) 1.2. Subjective wellbeing × gender (moderated mediation) (ns) 2. Cyber victimisation (internet) > subjective well being 2.1. Gender (moderated mediation) (ns) 2.2. Subjective wellbeing × gender (moderated mediation) (ns) N.A
Nguyen et al. (2020) (SDA)	SI	Past 12 months	1. Cyber victimisation × parental acceptance (ns) 2. Cyber victimisation × parental concentration*	N.A	1. Cyber victimisation > perceived stress***(p) 1.1. Revenge* (forgiveness) (moderated mediation) 1.2. Avoidance* (forgiveness) (moderated mediation)
Quintana-Orts et al. (2020)	SI	Past 12 months	N.A	N.A	1. Cyber victimisation > depression 2. Cyber victimisation > substance abuse
Reed et al. (2015) (SDA)	SI	Past 12 months	N.A	N.A	N.A
Rodelli et al. (2018)	SI	Past 6 months	N.A	1. Cyber perpetration × diet 2. Cyber victimisation × diet 3. Cyber perpetration × smoking (ns) 4. Cyber victimisation × smoking (ns)	N.A
Sampasa-Kanyinga et al., (2014) (SDA)	SI	Past 12 months	N.A	N.A	Cyber victimisation > depression (f)
Sampasa-Kanyinga et al. (2020) (SDA)	SI	Past 12 months	N.A	1. Cyber victimisation × parent–child relationship (ns) 2. Cyber victimisation × sex*	N.A
Combined Involvement António and Moleiro (2015)	SI	NR	N.A	1. Victimization × social support* 2. Victimization × parental support (ns)	N.A
Bonanno and Hymel (2010)	SI	Past month	N.A	1. Victimization × perceived social support* (family) 2. Victimization × perceived social support (friends) (ns)	1. Victimization > social hopelessness (p)
Henry et al. (2014)	SI	Past week	N.A	1. Victimization × meaning in life** (males) 2. Victimization × meaning in life (females) (ns)	1. Victimization > meaning in life (males) (ns) 2. Victimization > meaning in life*** (p) (females)
Roeder and Cole (2018)	SI	Past month	N.A	N.A	1. Victimization > perceived burdensomeness 2. Victimization > thwarted belongingness (ns) 3. Victimization > hopelessness (ns)

(f) full mediator, (p) partial mediator, (ns) not significant, bold = significant, SI: suicidal ideation, SDA: secondary data analysis.

* p < 0.05.

** p < 0.01.

*** p < 0.001.

association was heightened in girls (Yang et al., 2020). On the other hand, another study examined sex as a moderator between types of victimisation (verbal, physical and relational) and SI, but no associations were found (Hirschtritt et al., 2015).

Just one study examined biological gender as a moderator between perpetration and SI and revealed a higher risk in schoolgirls (Yang et al., 2020). The same authors examined biological gender as a moderator between perpetration-victimisation and SI, however, the outcome was

similar for both girls and boys.

3.9.1.2. *Cyber bullying involvement.* One study assessed gender as a moderator between victimisation and SI in school children, though, no interactions were reported (Lucas-Molina et al., 2018). However, one school study revealed that sex moderated the relationship: the risk was greater in girls (Sampasa-Kanyinga et al., 2020).

3.9.2. Depression

3.9.2.1. Traditional bullying involvement. Depression was assessed in two school studies as a mediator between victimisation and SI, which yielded significant results, though one study revealed partial mediation (Reed et al., 2015; Sampasa-Kanyinga et al., 2014). Similarly, depressive symptoms mediated the same association in two more studies (Fredrick and Demaray, 2018); however, this was only significant in females in one sample (Min et al., 2015). Nevertheless, a different school study reported that depression did not mediate general victimisation and SI in a school study; though it did when the independent variable was verbal/relational, or ethnic-biased victimisation (Cardoso et al., 2018).

Depression was examined as a moderator between verbal victimisation and SI in adolescents, but no interaction was reported (Barzilay et al., 2017). Still, when verbal victimisation, depression and parental support were assessed as a three-way interaction, this yielded significant results. The relationship between victimisation and SI was stronger in youth experiencing depression with reduced parental support (Barzilay et al., 2017).

3.9.2.2. Cyber bullying involvement. Two studies assessed depression as a mediator between victimisation and SI in school samples and found significant results (Reed et al., 2015), though one study revealed partial mediation (Sampasa-Kanyinga et al., 2014). Similarly, depressive symptoms mediated victimisation and SI in two other school studies (Fredrick and Demaray, 2018; Iranzo et al., 2019).

3.9.3. Parental

3.9.3.1. Traditional bullying involvement. One school study examined parental support as a moderator between verbal victimisation and SI in adolescents: this association was reinforced by low parental support (Barzilay et al., 2017). Similarly, parental warmth moderated victimisation and SI in an adolescent sample from a residential program: the association was weakened when parental warmth was elevated (Wright, 2016).

3.9.3.2. Cyber bullying involvement. An interaction effect was examined between cyber victimisation and parental concentration (e.g., over-protectiveness, restricting child's explorative behaviour) on SI: cyber victimised youth were less likely to engage in SI when perceived parental concentration was increased (Nguyen et al., 2020).

3.9.4. Personality/psychological

3.9.4.1. Traditional bullying involvement. Various personality and psychological factors have been assessed as moderators and mediators in school studies. One report revealed that forgiveness moderated victimisation and SI: low levels of forgiveness reinforced the direct relationship (Liu et al., 2013). Another study discovered that positive future orientation (i.e., motivations, thoughts, and feelings about the future) moderated the direct relationship: greater positive future orientation buffered against SI (Hong et al., 2020). Similarly, it was found that internal resilience moderated verbal victimisation and SI in a school study: SI was reduced when internal resilience was greater (Hirschtritt et al., 2015). On another note, negative self-talk and cognitive errors each moderated victimisation and SI in a clinical sample, but contrary to the authors' expectations, the positive relationship was stronger when negative self-talk and cognitive errors were reduced (Wolff et al., 2014).

Negative emotions have been found to partially mediate victimisation and SI in school children, however, the association was reduced when high self-esteem was present (Kim et al., 2020). Moreover, negative self-esteem (Jones et al., 2014) and interpersonal rejection sensitivity (Williams et al., 2017) have been reported as mediators between victimisation and SI in two psychiatric samples.

Three school studies have examined mediators between victimisation and SI. First, subjective well-being mediated the relationship, and this was moderated by gender; that is, the effect was stronger in girls (Lucas-Molina et al., 2018). Secondly, psychological security was identified as a mediator, but this was moderated by family functioning and gender: specifically, girls with better family functioning exhibited reduced psychological security and increased SI whilst experiencing victimisation (Peng et al., 2020). Thirdly, in middle school students, psychological pain fully mediated the relationship, but this was moderated by family togetherness; whereas, in high school students, psychological pain partially mediated the relationship, but this was moderated by peer support (Bao et al., 2020). Specifically, increased family togetherness and peer support independently reduced the effect of psychological pain on SI in victimised school students.

3.9.4.2. Cyber bullying involvement. Referring to victimisation and SI, one school study has reported that perceived stress mediates the relationship (Quintana-Orts et al., 2020). The authors examined whether negative subcategories of forgiveness, namely vengeance and avoidance, moderated the mediation model. It was revealed that each subcategory independently moderated the mediating effect between perceived stress and SI. The mediating effect was stronger when motivation for vengeance was high, and when avoidance was high (Quintana-Orts et al., 2020). Equally, another study reported that perceived stress mediated victimisation and SI, as well as psychological distress and loneliness (Iranzo et al., 2019). In another school study, victimisation and SI was partially mediated by negative emotions, though the impact of negative emotions on SI was reduced when self-esteem was elevated (Kim et al., 2020).

Furthermore, various forms of life satisfaction partially mediated victimisation and SI in a school sample (Chang et al., 2019). Comparably, subjective well-being mediated two types of victimisation, namely mobile and internet, and SI in school kids (Lucas-Molina et al., 2018). For mobile victimisation, the effect was stronger in girls, whereas gender did not moderate the mediation for internet victimisation.

3.9.4.3. Combined bullying involvement. Meaning in life (i.e., perceiving life as meaningful, a sense of purpose) has been shown to partially mediate the relationship between victimisation and SI, but this effect was only found in females (Henry et al., 2014). Conversely, victimisation and SI was moderated by meaning in life, but this protective effect was only found in males.

Moreover, social hopelessness was found to partially mediate victimisation and SI in a school study (Bonanno and Hymel, 2010). However, conflicting results were found in another school sample. Hopelessness did not mediate this relationship, nor did thwarted belongingness: though, perceived burdensomeness was a mediator (Roeder and Cole, 2018).

3.9.5. Social/environmental

3.9.5.1. Traditional bullying involvement. In one study, perceived social support both partially mediated and moderated victimisation and SI in a school sample (Liu et al., 2017). When perceived support was low, the association between victimisation and SI was stronger, whereas when perceived support was high, the association was weaker (Liu et al., 2017). Similarly, in another school study, peer support moderated verbal victimisation and suicidal thoughts: the association was reinforced when adolescents experienced reduced peer support (Barzilay et al., 2017).

Furthermore, school belongingness mediated victimisation and SI in an LGBTQ school sample (Hatchel et al., 2019). Another school study revealed that grade moderated perpetration and SI: the effect was elevated in 6th and 9th graders (Gower and Borowsky, 2013).

3.9.5.2. Cyber bullying involvement. One school study found that substance abuse mediated victimisation and SI (Reed et al., 2015). Equally, diet has been shown to moderate both victimisation and perpetration on SI in school children: victimised youth with healthier diets had lower SI (Rodelli et al., 2018).

3.9.5.3. Combined bullying involvement. In a sample of Lesbian, Gay and Bisexual (LGB) youth, social support was found to moderate homophobic victimisation and SI: this relationship was stronger when social support was low (António and Moleiro, 2015). In contrast, a school study revealed that perceived social support, namely family, moderated victimisation and SI: this association was stronger when perceived family support was low (Bonanno and Hymel, 2010).

3.10. The relationship between bullying involvement and self-harmful behaviour

3.10.1. Socio-demographic

3.10.1.1. Traditional bullying involvement. As shown in Table 4, several studies have assessed gender differences between bullying involvement and self-harmful behaviours; however, the findings are inconsistent. One school study reported that victimisation and STB were moderated by gender, and the relationship was stronger in girls (Wang et al., 2018). Another study assessed gender as a moderator between types of victimisation and SA, however only a significant result was found for verbal victimisation: the relationship was elevated in adolescent boys (Arango et al., 2016). On the other hand, one school study found no interactions whilst assessing gender as a moderator between types of victimisation and self-harmful behaviour (Dempsey et al., 2011). Equally, gender did not moderate either victimisation or types of perpetration on SA in adolescents (Gower and Borowsky, 2013; Arango et al., 2016).

One school study found that biological gender was a moderator between victimisation and SA, and perpetration and SA: the associations were stronger in schoolgirls (Yang et al., 2020). Also, findings revealed that biological gender was a moderator between perpetration-victimisation and SA, however, the association was stronger in schoolboys.

One school study assessed SP and interaction effects between victimisation and sexualities in adolescents with same-sex partners: a significant effect was found for adolescents who identified as heterosexual (Turpin et al., 2019).

3.10.1.2. Cyber bullying involvement. Just one study examined gender as a moderator between victimisation and STB in youth: it was revealed that the association was stronger in schoolgirls (Wang et al., 2018). A school study assessing sex as a moderator between victimisation and SA did not find any interactions (Sampasa-Kanyinga et al., 2020).

3.10.2. Depression

3.10.2.1. Traditional bullying involvement. Depression was reported as an interacting variable between two types of victimisation, specifically physical and verbal, and SR: victimised adolescents who experienced increased depression were at greater risk of suicide (Kodish et al., 2016). Moreover, school studies reported that depression was a full and partial mediator between victimisation and SA (Bauman et al., 2013; Kim et al., 2018; Sampasa-Kanyinga et al., 2014), and a partial mediator between victimisation and SP (Sampasa-Kanyinga et al., 2014) and SH (Brunstein Klomek et al., 2016). Equally, depression mediated the relationship between bullying perpetration and SA, but this effect was found only in schoolgirls (Bauman et al., 2013).

Furthermore, it was reported that depressive mood was a partial mediator between both victimisation and perpetration, and NSSI in a school sample (Claes et al., 2015). Interestingly, a moderated mediation

analysis revealed that the relationship between depressive mood and NSSI was reduced in perpetrators who perceived their parents as supportive (Claes et al., 2015). Similarly, in a study involving a clinical sample, depressive symptoms partially mediated victimisation and NSSI (Baiden et al., 2017). A school study conducted a joint mediation analysis and revealed that self-hate and depressive symptoms jointly mediated the relationship between victimisation and NSSI (Xavier et al., 2016).

On another note, one school study examined depression as a moderator between verbal victimisation and SA, however no interaction was found (Barzilay et al., 2017). Instead, a three-way interaction between verbal victimisation, anxiety and parental support revealed significant results. The direct association was stronger for adolescents experiencing increased anxiety with low parental support (Barzilay et al., 2017).

3.10.2.2. Cyber bullying involvement. In a study consisting of adolescents from paediatric primary care, the interaction between victimisation and depression was examined on SR which produced a significant result (Kodish et al., 2016). It was found that experiencing victimisation with greater depression increased SR.

Similarly, three studies have investigated depression as a mediator between victimisation and SA in school samples (Bauman et al., 2013; Kim et al., 2018; Sampasa-Kanyinga et al., 2014). All studies reported significant findings, though one study discovered that the effect was present in girls only (Bauman et al., 2013). Comparably, depression mediated victimisation and SP in youth (Sampasa-Kanyinga et al., 2014). On the other hand, one study found no association whilst examining depression as a mediator between perpetration and SA (Bauman et al., 2013).

3.10.2.3. Combined bullying involvement. One study examined the interaction between victimisation and depression on SR and found a significant result (Kodish et al., 2016). Similarly, another study found that depression mediated the relationship between victimisation and suicide, but in multiple races and ethnicities (Li and Shi, 2018).

3.10.3. Parental

3.10.3.1. Traditional bullying involvement. One study discovered that parental support moderated both victimisation and perpetration on NSSI in school children: for both types of bullying involvement, high parental support buffered against NSSI (Claes et al., 2015). Another study reported that parental support moderated verbal victimisation and SA in school children, though the direct association was reinforced when youth experienced low parental support (Barzilay et al., 2017). Similarly, parental warmth moderated victimisation and NSSI in an adolescent sample from a residential program: greater levels of parental warmth weakened the direct association (Wright, 2016).

Furthermore, one school study demonstrated that perceived parental involvement moderated victimisation and STB (Wang et al., 2019). At the same time, parental involvement and gender jointly moderated the relationship between victimisation and STB in another sample: it was revealed that higher levels of perceived parental involvement weakened the association between the victimisation and STB, specifically in girls (Wang et al., 2018).

On a similar note, maternal psychological control moderated victimisation and SH in a sample of left-behind children: the relationship was strengthened with high psychological control (Xiong et al., 2019). A three-way interaction between victimisation, maternal psychological control, and maternal behavioural control on SH was assessed. When maternal psychological control was low, maternal behavioural control reinforced the relationship between victimisation and SH, whereas when maternal psychological control was high, maternal behavioural control weakened the direct relationship (Xiong et al., 2019).

Table 4
Summary of interacting, moderating and mediating variables associated with self-harmful behaviour.

	Author (year)	Outcome	Timespan	Interactions	Moderators	Mediators
<i>Face-to-face Involvement</i>	Arango et al. (2016)	SA	Lifetime	N.A	1. Victimisation (verbal) × gender* 2. Victimisation (relational, physical) × gender (ns) 3. Perpetration types × gender (ns) 4. Victimisation types × social connectedness (ns) 5. Perpetration types × social connectedness (ns)	N.A
	Baiden et al. (2017) (SDA)	NSSI	Lifetime	N.A	N.A	Victimisation > depressive symptoms (p)***
	Bauman et al. (2013) (SDA)	SA	Past 12 months	N.A	N.A	1. Victimisation > depression (ns) 1.1. Gender (moderated mediation) 2. Perpetration > depression (ns) 2.2. Gender (moderated mediation)
	Barzilay et al. (2017) (SEYLE study)	SA	Lifetime	N.A	1. Victimisation × depression (ns) 2. Victimisation × anxiety (ns) 3. Verbal victimisation × parental support** 4. Physical victimisation × parental support (ns) 5. Relational victimisation × parental support (ns) 6. Victimisation × peer support (ns) 7. Verbal victimisation × anxiety × parental support*	N.A
	Brunstein Klomek et al. (2016) (SEYLE study)	SH	Lifetime	N.A	1. Victimisation (relational, verbal, and physical) × gender (ns) 2. Relational victimisation × pro-social behaviour** 3. Physical victimisation × peer support***	1. Verbal victimisation > depression (p) 2. Relational victimisation > depression (p) 3. Relational victimisation > anxiety (ns)
	Claes et al. (2015)	NSSI	Lifetime	N.A	1. Victimisation × parental support*** 2. Perpetration × parental support*	1. Victimisation > depressive mood (p) 1.1. Parental support (moderated mediation) 2. Perpetration > depressive mood (p) 2.2. Parental support* (moderated mediation)
	Dempsey et al. (2011) (SDA)	Suicidality	Past 12 months	N.A	1. Relational victimisation × gender (ns) 2. Overt victimisation × gender (ns)	N.A
	Duong and Bradshaw (2014) (SDA)	SA/SSA	Past 12 months	N.A	Victimisation × school connectedness (ns)	N.A
	Esposito et al. (2019)	NSSI	Past 6 months	N.A	1. Perpetration × peer rejection (ns) 2. Victimisation × peer rejection* 3. Perpetration-victimisation × peer rejection* 4. All roles × peer rejection (frequency of NSSI) (ns)	N.A
	Gower and Borowsky (2013) (SDA)	SH/SA	Past year	N.A	1. Victimisation × grade (SH) 2. Perpetration × grade (SH) 3. Victimisation/perpetration × gender (SA) (ns) 4. Victimisation/perpetration × grade (SA) (ns)	N.A
	Hatchel et al. (2019) (SDA)	SA	Past 12 months	N.A	N.A	1. Victimisation > self-compassion 2. Victimisation > school belongingness
	Jutengren et al. (2011)	SH	Past 6 months	N.A	1. Victimisation × self-regulation (ns) 2. Victimisation × impulsivity (ns)	N.A
	Kim et al. (2018) (SDA)	SA	Past 12 months	N.A	N.A	Victimisation > depression*** (p)
	Kodish et al. (2016)	SR	Lifetime	1. Verbal victimisation × depression** 2. Physical victimisation × depression**	N.A	N.A

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Table 4 (continued)

Author (year)	Outcome	Timespan	Interactions	Moderators	Mediators
Litwiller and Brausch (2013) (SDA)	SB	Past year	N.A	N.A	1. Physical victimisation > substance use (p) 2. Physical victimisation > violent behaviour (p) 3. Physical victimisation > sexual behaviour (ns)
Moon et al. (2015) (SDA)	SB	Past year	N.A	N.A	1. Victimization > aggression*** 2. Victimization > substance use*** 3. Victimization > risky sexual behaviour (ns)
Peng et al. (2020)	SA	Past 6 months	N.A	N.A	1. Victimization > psychological security (p) 1.1. Family functioning × gender (moderated mediation)
Quintana-Orts and Rey (2018)	SR	Past year	N.A	Victimization × forgiveness*	N.A
Reed et al. (2015) (SDA)	SA	Past 12 months	N.A	N.A	Victimization > violent behaviour
Rey et al. (2019)	STB	Lifetime	N.A	Victimization × gratitude*** (girls)	N.A
Sampasa-Kanyinga et al. (2014) (SDA)	SP/SA	Past 12 months	N.A	N.A	1. Victimization > depression (p) (SP) 2. Victimization > depression (f) (SA)
Stewart et al. (2018)	SP/SA	Past month	N.A	N.A	1. Overt victimisation > NSSI > risky behaviour (boys) (SA) 1.1. Overt victimisation > NSSI (ns) 1.2. Overt victimisation > risky behaviour (boys) 1.3. Age (ns) and gender (moderated mediation) 2. Reputational victimisation > NSSI > risky behaviour (boys) (SA) 2.1. Reputational victimisation > NSSI (ns) 2.2. Reputational victimisation > risky behaviour (boys) 2.3. Age (ns) and gender (moderated mediation) 3. Overt victimisation > NSSI > risky behaviour (ns) (SP) 3.1. Overt victimisation > NSSI (ns) 3.2. Overt victimisation > risky behaviour (ns) 3.3. Age and gender (ns) (moderated mediation) 4. Relational victimisation > NSSI > risky behaviour (ns) (SP) 4.1. Relational victimisation > NSSI (ns) 4.2. Relational victimisation > risky behaviour (ns) 4.3. Age and gender (ns) (moderated mediation)
Turpin et al. (2019) (SDA)	SP	Past 12 months	1. Victimization × heterosexual* 2. Victimization × gay/lesbian (ns) 3. Victimization × bisexual (ns) 4. Victimization × unsure of sexuality (ns)	N.A	N.A
Wang et al. (2018) (SDA)	STB	Past year	N.A	1. Victimization × perceived parental involvement (individual level) (ns) 2. Victimization × school climate*** (individual level) 3. Victimization × school climate (school level) (ns) 4. Victimization × gender*** 5. Victimization × parental involvement × gender*** 6. Victimization × climate (individual/school level) × gender (ns)	N.A
	STB	Past year	N.A		N.A

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Table 4 (continued)

	Author (year)	Outcome	Timespan	Interactions	Moderators	Mediators
	Wang et al. (2019) (SDA)				Victimisation × perceived parental involvement *** (student/school level)	
	Wright (2016)	NSSH	Lifetime	N.A	1. Victimisation × parental warmth * 2. Perpetration × parental warmth (ns)	N.A
	Xavier et al. (2016)	NSSI	Lifetime	N.A	N.A	Victimisation > hated self > depressive symptoms ***
	Xiong et al. (2019)	SH	Past 6 months	N.A	1. Victimisation × maternal psychological control ** 2. Victimisation × maternal behavioural control * 3. Victimisation × maternal psychological control × maternal behavioural control ***	N.A
	Yang et al. (2020)	SA	Past 12 months	N.A	1. Victimisation × biological gender 2. Perpetration × biological gender 3. Perpetration-victimisation × biological gender	N.A
Cyber Involvement	Bauman et al. (2013) (SDA)	SA	Past 12 months	N.A	N.A	1. Cyber victimisation > depression 1.1. Gender (moderated mediation) 2. Cyber perpetration > depression (ns) 2.2. Gender (moderated mediation) (ns) Cyber victimisation > psychological distress (f)
	Cénat et al. (2019)	Suicidality	Past 6 months	N.A	N.A	N.A
	Duong and Bradshaw (2014) (SDA)	SA/SSA	Past 12 months	N.A	Cyber victimisation × school connectedness (ns)	N.A
	Extremera et al. (2018)	SR	Lifetime	N.A	Cyber victimisation × emotional Intelligence ***	N.A
	Kim et al. (2018) (SDA)	SA	Past 12 months	N.A	N.A	Cyber victimisation > depression *** (p)
	Kodish et al. (2016)	SR	Lifetime	Cyber victimisation x depression **	N.A	N.A
	Litwiller and Brausch (2013) (SDA)	SB	Past year	N.A	N.A	1. Cyber victimisation > substance use (p) 2. Cyber victimisation > violent behaviour (p) 3. Cyber victimisation > sexual behaviour (ns)
	Nguyen et al. (2020) (SDA)	SP/SH	Past 12 months	1. Cyber victimisation × parental acceptance (SP) (ns) 2. Cyber victimisation × parental concentration * (SP) 3. Cyber victimisation × parental acceptance (SH) (ns) 4. Cyber victimisation × parental concentration (SH) (ns)	N.A	N.A
	Quintana-Orts and Rey (2018)	SR	SR	N.A	Cyber victimisation × forgiveness (ns)	N.A
	Reed et al. (2015) (SDA)	SA	Past 12 months	N.A	N.A	Cyber victimisation > violent behaviour
	Sampasa-Kanyinga et al. (2014) (SDA)	SP/SA	Past 12 months	N.A	N.A	1. Cyber victimisation > depression (f) (SP) 2. Cyber victimisation > depression (f) (SA)
	Sampasa-Kanyinga et al. (2020) (SDA)	SA	Past 12 months	N.A	1. Cyber victimisation × parent-child relationship (ns) 2. Cyber victimisation × sex (ns)	N.A
	Wang et al. (2018) (SDA)	STB	Past year	N.A	1. Cyber victimisation × parental involvement (individual level) (ns) 2. Cyber victimisation × school climate (individual level) (ns) 3. Cyber victimisation × school climate *** (school level) 4. Cyber victimisation × gender ***	N.A

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Table 4 (continued)

Author (year)	Outcome	Timespan	Interactions	Moderators	Mediators	
Wang et al. (2019) (SDA)	STB	Past year	N.A	5. Cyber victimisation × parental involvement × gender * 6. Cyber victimisation × climate (individual/school level) × gender (ns)	N.A	
Yu et al. (2020)	NSSI	Past 6 months	N.A	1. Cyber victimisation × perceived parental involvement *** (student/school level) 2. Cyber victimisation × home-based involvement 3. Cyber victimisation × academic expectation N.A	1. Cyber victimisation > school engagement ** 1.1. Sensation seeking ** (moderated mediation) 1.2. Gender (ns) N.A	
Combined Involvement	Duong and Bradshaw (2014) (SDA)	SA/SSA	Past 12 months	N.A	Victimisation × school connectedness *	N.A
	Kodish et al. (2016)	SR	Lifetime	Victimisation × depression **	N.A	N.A
	Li and Shi (2018) (SDA)	Suicide	Past 12 months	N.A	N.A	1. Victimization > alcohol use * (Hispanic) 2. Victimization > tobacco use (ns) 3. Victimization > marijuana use (ns) 4. Victimization > other drug use * (White) 5. Victimization > depression (white**, Hispanic***, Asian and Pacific Islander***, mixed race/ethnicity***)

(f) full mediator, (p) partial mediator, (ns) not significant, bold = significant, SA: suicide attempts; SSA: serious suicide attempts; SR: suicide risk; SP: suicide planning; SB: suicidal behaviour; STB: suicidal thoughts and behaviours; SH: self-harm; NSSH: non-suicidal self-harm; NSSI: non-suicidal self-injury; SDA: secondary data analysis.

* p < 0.05.

** p < 0.01.

*** p < 0.001.

3.10.3.2. *Cyber bullying involvement.* Parental involvement also moderated victimisation and STB in two school samples (Wang et al., 2019), though one study revealed that this moderation was present in girls (Wang et al., 2018). Interestingly, parental involvement strengthened the relationship; however, when parental support was split into subtypes, home-based involvement weakened the direct relationship, whilst academic expectation reinforced it (Wang et al., 2019).

In addition to these factors, another school study assessed parental concentration and parental acceptance as interacting variables between cyber victimisation and self-harmful behaviours, namely SH and SP (Nguyen et al., 2020). Only cyber victimisation and parental concentration produced an interacting effect on SP; that is, greater parental concentration was associated with reduced SP.

3.10.4. Personality/psychological

3.10.4.1. *Traditional bullying involvement.* One study examined violent behaviour as a mediator between victimisation and SA in school children, yielding a significant result (Reed et al., 2015). Likewise, another study discovered that violent behaviour partially mediated physical victimisation and SB (Litwiller and Brausch, 2013). Furthermore, aggression mediated victimisation and SB in school children (Moon et al., 2015).

Risky behaviour has been shown to mediate both overt and reputational victimisation and SA in a clinical sample of adolescents, however the effects were elevated in boys only (Stewart et al., 2018). Risky behaviour and NSSI jointly mediated the direct relationships, and again, the effects were visible in boys. The same analyses were performed for SP; however, no associations were reported (Stewart et al., 2018).

Nevertheless, a longitudinal school study assessed impulsivity and self-regulation as independent mediators between victimisation and SH; however, no associations were found (Jutengren et al., 2011).

Other mediating factors have been examined between victimisation and self-harmful behaviour. Self-compassion mediated victimisation and SA in LGBTQ youth (Hatchel et al., 2019), while gratitude moderated victimisation and STB in schoolgirls (Rey et al., 2019). Specifically, higher levels of gratitude were associated with reduced STB in victimised girls. Furthermore, psychological security mediated perpetration-victimisation and SA in a school study, which was moderated by family functioning and gender: victimised schoolgirls with better family functioning were more likely to have compromised psychological security (Peng et al., 2020).

A school study reported that forgiveness moderated the relationship between victimisation and SR: greater levels of forgiveness was associated with reduced SR (Quintana-Orts and Rey, 2018).

3.10.4.2. *Cyber bullying involvement.* Two studies consisting of school samples discovered that violent behaviour mediated victimisation and self-harmful behaviour, specifically SA and SB (Reed et al., 2015; Litwiller and Brausch, 2013), whilst psychological distress mediated victimisation and suicidality in a sample of undergraduates (Cénat et al., 2019). Furthermore, emotional intelligence moderated victimisation and SR in a school sample: when emotional intelligence was high, the direct association weakened implying a buffering effect (Extremiera et al., 2018).

3.10.5. Social/environmental

3.10.5.1. Traditional bullying involvement. Many studies have examined school factors as moderators and mediators between bullying involvement and self-harmful behaviour. One study found that school belongingness mediated victimisation and SA in an LGBTQ sample (Hatchel et al., 2019). Similarly, school climate moderated between victimisation and STB in youth: a positive school climate (specifically at individual level rather than school level), played a buffering role in the association (Wang et al., 2018). Moreover, in a school study, peer support moderated physical victimisation and SH, whilst pro-social behaviour moderated relational victimisation and SH (Brunstein Klomek et al., 2016). It was shown that victimised adolescents were at lower risk of SH when peer support and pro-social behaviour was elevated. Interestingly, in another study it was reported that peer rejection moderated both victimisation and perpetration on NSSI in school children: greater peer rejection reinforced both relationships (Esposito et al., 2019).

Furthermore, school grade moderated both victimisation and perpetration on SH in adolescents: victimisation was higher in 12th graders, whilst perpetration was higher in 6th graders (Gower and Borowsky, 2013).

In addition to school factors, two studies reported that substance use mediated victimisation and SB in youth (Litwiller and Brausch, 2013; Moon et al., 2015).

3.10.5.2. Cyber bullying involvement. One school study has shown that a positive school climate, (specifically at school level rather than individual level), buffered the impact of victimisation on STB (Wang et al., 2018). Similarly, another study reported that school engagement mediated victimisation and NSSI (Yu et al., 2020). This mediation model was moderated by sensation seeking: lower school engagement was associated with greater NSSI, when sensation seeking was elevated. On another note, one study revealed that substance use partially mediated victimisation and SB in a school sample (Litwiller and Brausch, 2013).

3.10.5.3. Combined bullying involvement. In a study consisting of school children, school connectedness moderated victimisation and self-harmful behaviours, namely SA and serious SA (Duong and Bradshaw, 2014). It was found that victimised LGB youth who perceived a greater connection to school were less likely to engage in self-harmful behaviour.

Another study examined alcohol and drug use between victimisation and suicide among ethnic and racial groups: alcohol mediated the relationship in Hispanic individuals, whilst drug use mediated the relationship in white individuals (Li and Shi, 2018).

4. Discussion

4.1. Summary of evidence

This review achieved the objective of identifying interactions, moderators, and mediators between traditional and cyber bullying involvement and SHTB in young people. However, there was a paucity of replicated studies and considerable heterogeneity among predictors, third variables, and outcomes. Consequently, it was difficult to draw firm conclusions about important third variables that moderate and mediate this complex relationship. Importantly, this review provides a narrative synthesis and quality assessment of global research and highlights key factors in a multifaceted field.

The most frequently researched factor in this review was the mediating role of depression between victimisation and SHTB in school-based studies. Depression was identified as a mediator between traditional and cyber victimisation and SI (Fredrick and Demaray, 2018; Iranzo et al., 2019; Min et al., 2015; Reed et al., 2015; Sampasa-Kanyinga et al., 2014), although, one study highlighted depression as a mediator

between specific types of victimisation (i.e., verbal, relational, and ethnic-biased) and SI (Cardoso et al., 2018). Equally, depression was identified as a mediator between traditional and cyber victimisation and self-harmful behaviours, including suicide planning and attempts (Bauman et al., 2013; Kim et al., 2018; Li and Shi, 2018; Sampasa-Kanyinga et al., 2014) and self-harm (Brunstein Klomek et al., 2016; Claes et al., 2015; Xavier et al., 2016). Although this research suggests a potential pattern between bullying involvement and SHTB, it should be noted that only one study was rated low risk of bias (Li and Shi, 2018) and most studies did not adjust for confounders. Moreover, outcome measures and statistical methods varied; hence, replicated studies are needed to ensure findings are credible. Nevertheless, a recent systematic review has established the role of depressive symptoms as a mediator between school victimisation and self-harm, whilst considering important confounding factors (Karanikola et al., 2018).

Interestingly, this review uncovered some notable findings regarding the moderation effects of gender on the mediation model involving depression. One study found that depression mediated the relationships between cyber victimisation/traditional perpetration and SA, however the indirect effects were significant for females only (Bauman et al., 2013). Similarly, another study reported that the relationship between traditional victimisation and SI was mediated by symptoms of depression, but only in females (Min et al., 2015). Hence, it is possible that females involved in bullying may be at a greater risk for suicide if depression is present. However, more research is needed to replicate these findings given there are only two studies reported here, each reflecting heterogeneity in terms of the roles involved in bullying and the outcome variables of interest. Nevertheless, a recent systematic review has confirmed that depressive symptoms increase the risk for suicide attempts in only female adolescents (Miranda-Mendizabal et al., 2019), suggesting that the clustering of risk factors of depression and bullying involvement may confer particular vulnerability for females.

Although this body of research is pivotal, a re-examination of depression for suicide risk has demonstrated that only a small number of clinically depressed individuals go on to end their lives (Bostwick and Pankratz, 2000). Consequently, the interplay between depression and SI and behaviour is complex and requires detailed exploration (De Beurs et al., 2021). An interesting study in this review highlighted the importance of examining joint mediators when investigating the role of depression on SHTB. It was discovered that NSSI worsened in victimised youth when depressive symptoms and self-criticism coincided (Xavier et al., 2016). This finding is consistent with the IMV model as it is suggested that people who possess certain characteristics, such as socially prescribed perfectionism or pessimism, are highly sensitive to adverse interpersonal events, and this can result in feelings of defeat and/or humiliation (O'Connor, 2011; O'Connor and Kirtley, 2018). It is theorised that when these feelings co-occur with a sense of entrapment, it can lead to the emergence of suicidal thoughts (O'Connor, 2011; O'Connor and Kirtley, 2018). In support, findings from this review revealed that increased peer rejection strengthened the relationship between traditional victimisation and perpetration-victimisation and NSSI in school children (Esposito et al., 2019), whilst interpersonal rejection sensitivity and low self-esteem each mediated the relationship between traditional victimisation and SI in adolescents in psychiatrically-referred samples (Jones et al., 2014; Williams et al., 2017). Still, the risk of a type II error cannot be ruled out considering the small sample sizes of these studies (Nayak, 2010). Relatedly, another study in this review found that the relationship between victimisation and SI was partially mediated by negative emotions in adolescents, however the impact of negative emotions on SI was reduced when high self-esteem was present (Kim et al., 2020). Research from the wider literature has demonstrated that high levels of self-esteem can be a protective factor, whereas low self-esteem can be a risk factor for SHTB, particularly in young people with experience of adverse life events (Soto-Sanz et al., 2019; Wang et al., 2020).

Furthermore, it is theorised that people who feel a sense of

entrapment may go on to experience SI and intent, however, this is determined by the existence of motivational moderators which enhance the risk (e.g., perceived burdensomeness, low resilience), or reduce the risk (e.g., realistic positive future thinking, reasons for living) (O'Connor, 2011; O'Connor and Kirtley, 2018). This review has identified similar factors that appear to buffer against SHTB in young people involved in school bullying. Positive future orientation, internal resilience, forgiveness, emotional intelligence, and meaning in life were protective of SI/SR in youth experiencing victimisation (Extremera et al., 2018; Henry et al., 2014; Hirschtritt et al., 2015; Hong et al., 2020; Liu et al., 2013; Quintana-Orts and Rey, 2018). Still, the risk of bias varied between studies, hence, these findings should be interpreted with caution. Referring to the wider literature, comparable findings have been reported, but in adult-majority populations. A recent systematic review has shown that increased levels of self-compassion and self-forgiveness reduces SI and self-harm (Cleare et al., 2019).

Similarly, according to the IMV model, interpersonal motivational moderators (e.g., belongingness, connectedness) are thought to buffer against SI and intent (O'Connor, 2011; O'Connor and Kirtley, 2018). A notable pattern has appeared in this review showing that interpersonal factors play alleviating roles in SHTB in young people involved in traditional and cyber bullying. When experienced in high levels, buffering factors include parental warmth, parental concentration, parental support, parental involvement, family togetherness, social support, peer support, pro-social behaviour, positive school climate, school belongingness and school connectedness (Bao et al., 2020; Brunstein Klomek et al., 2016; Claes et al., 2015; Duong and Bradshaw, 2014; Hatchel et al., 2019; Liu et al., 2017; Nguyen et al., 2020; Wang et al., 2018; Wright, 2016). Unsurprisingly, when these factors are experienced in low levels, they increase the risk for SHTB in young people involved in bullying (António and Moleiro, 2015; Barzilay et al., 2017; Bonanno and Hymel, 2010; Liu et al., 2017; Wright, 2016). In addition, social hopelessness and loneliness have been found to mediate the relationship between victimisation and SI (Bonanno and Hymel, 2010; Iranzo et al., 2019). Interestingly, a longitudinal study from this review examined thwarted belongingness, hopelessness, and perceived burdensomeness as mediators between victimisation and SI, however, only the latter was significant (Roeder and Cole, 2018). Pulling these findings together, it is evident that interpersonal factors influence the risk of SHTB in young people involved in bullying. Consequently, these should be prioritised in future interventions. A recent systematic review has demonstrated that school-based interventions are effective in reducing both SI and attempts in young people, while group and family-based interventions are effective in reducing attempts (Calear et al., 2016).

As a final point, it is theorised that impulsivity and a history of self-harm increases a person's acquired capability for suicide (Joiner, 2005; O'Connor, 2011; O'Connor and Kirtley, 2018). These are known as volitional moderators in the IMV model, which play a vital role in the shift from suicidal thoughts and intent to behaviour (O'Connor, 2011; O'Connor and Kirtley, 2018). This review revealed that risky behaviour independently and jointly with NSSI mediated the relationship between types of traditional victimisation and suicide attempts in adolescent boys (Stewart et al., 2018); however, a prospective study examining impulsivity as a moderator between traditional victimisation and self-harm found no association (Jutengren et al., 2011). These inconsistent findings are not unexpected given that the concepts of risky behaviour and impulsivity differ, as well as the outcomes (Lockwood et al., 2017). However, conflicting results have been frequently reported by other studies examining impulsivity in SHTB in young people (Hawton et al., 2002; Janis and Nock, 2009).

4.2. Strengths, limitations, and future research

This is the first systematic review to extensively assess third variables between bullying involvement and SHTB in young people. Taking a holistic approach, this review considers essential features of bullying (i.

e., the context, involvement, and the nature of the involvement), whilst unravelling the widespread literature, distinguishing factors associated with suicidal thoughts and suicidal behaviours, and considering the use of theoretical frameworks within research.

This review encountered some limitations which should be recognized. Since a significant proportion of studies were considered high risk of bias (79 %), conclusions should be interpreted with caution and considered in the context of the following methodological limitations. Firstly, all findings were obtained using cross-sectional designs except for two studies; therefore, causal inferences cannot be assumed, and exploratory explanations should be carefully considered. Secondly, referring to only cross-sectional studies, sample sizes were not justified, nor were power calculations offered for main analyses or moderation/mediation analyses, except for three studies (Dempsey et al., 2011; Liu et al., 2013; Quintana-Orts and Rey, 2018). Thus, studies may have been under-powered to demonstrate associations, especially for mediator and moderator variables (Nayak, 2010). Just 56 % of cross-sectional studies used validated measurement tools to assess bullying involvement, hence the risk of bias may be elevated in just under half due to unknown reliability and validity (Lai, 2013). Referring to all studies, 42 % did not adjust for basic confounders, such as age and gender; thus, true associations may have been distorted (Skelly et al., 2012).

Many studies combined both traditional and cyber bullying within one analysis which prevented a complete synthesis. Although traditional and cyber bullying can overlap, recent research has demonstrated why it is important to examine traditional and cyber bullying independently on SHTB. In a study by Perret et al. (2020), the risks of serious SI and attempts were assessed in victimised adolescents. Cross-sectional analyses revealed an increased risk in adolescents experiencing pure cyber victimisation, or both traditional and cyber victimisation, compared to adolescents experiencing pure traditional victimisation or none at all. Through prospective analyses, it was discovered that cyber victimisation was unrelated to serious SI and attempts after two years from baseline, whilst traditional victimisation was associated. Two important conclusions were drawn from this: the consequences of cyber and traditional victimisation are distinct, and cyber victimisation may present immediate risk in young people, though it may be temporary. Hence, it is essential that future research considers the significance of bullying context and the associated repercussions. Also, a large amount of research within this review focused on victimisation; thus, further research which considers perpetration and perpetration-victimisation is required.

Similarly, many studies in this review combined suicidal thoughts with behaviour into single analyses making it difficult to synthesise the data and draw robust conclusions. As previously mentioned, determining the differing factors associated with serious SI, attempts and repeated attempts is crucial for developing awareness and informing policy and interventions (O'Connor and Nock, 2014). Furthermore, less than half of the included studies were influenced by theory. It is important that future research verifies and refutes contemporary theories to develop evidence-based interventions (O'Connor and Nock, 2014). As the IMV model incorporates biopsychosocial factors in the pathway to ideation and behaviour, it is highly useful for researchers aiming to understand the complicated relationship between bullying involvement and SHTB. Future research could examine the main components of the IMV model, that is, defeat/humiliation and entrapment, between bullying involvement and SI, since this review did not detect any studies which explored these key factors.

This review has a few limitations. First, the ability to combine results and develop conclusions were restricted by high heterogeneity and minimal studies replicating the same interactions, moderators, and mediators. Second, many studies contained incomplete information on study characteristics, such as age; therefore, this review is restricted to the available data. Third, numerous studies examining important factors were not included in this review as they did not meet the inclusion criteria; thus, the analysis is limited to the studies included.

4.3. Implications

Although this review has identified a range of factors which influence the relationship between bullying involvement and SHTB, specific patterns have emerged which could be valuable, particularly for school-based prevention strategies. Policy makers should consider implementing protective factors into prevention programs targeting SHTB, such as, promoting a positive school climate, emphasising belongingness and peer support, and encouraging positive future thinking, forgiveness, and resilience. Promoting parental support, warmth, involvement, and family connectedness within the home environment could also help to reduce the risk of SHTB in youth involved in bullying.

5. Conclusion

This systematic review highlights the intricate nature of the relationship between bullying involvement and SHTB in young people, whilst drawing on wide-ranging factors from a large body of research. Due to significant heterogeneity, the synthesising process was hindered, however, tentative conclusions suggest that depression mediates the relationship between traditional and cyber victimisation and SHTB in young people. It has also emerged that females involved in bullying may potentially be at greater risk of suicide if depression is also present. This review makes a significant contribution to the literature offering important suggestions for future research: achieving a global consensus and cohesively integrating a theoretical framework that is refutable and practical, is vital for informing suicide prevention and developing effective interventions.

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CRediT authorship contribution statement

All authors designed the study and wrote the protocol. HM and AJW were responsible for methodology (screening and selection of studies, data extraction and quality assessment). HM was responsible for data synthesis and wrote the first draft of the manuscript. ET and KS supervised the study. All authors contributed to and have approved the final manuscript.

Conflict of interest

None.

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