

Review Paper

Risk Factors of Depression Among Adolescents With Non-suicidal Self-injury: A Systematic Review

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ABSTRACT

Background: Non-suicidal self-injury (NSSI) has gained increasing recognition in recent years as a common mental health concern among adolescents, often co-occurring with symptoms of depression. So, depressed adolescents with NSSI are significantly more likely to report higher levels of suicidal ideation and attempts and to exhibit suicidal behavior over time. Although NSSI has multiple risk factors, depression may act as a mediator that exacerbates or prolongs NSSI behaviors. This review aims to find the risk factors for depression among adolescents with NSSI.

Methods: This review followed the PRISMA (the preferred reporting items for systematic reviews and meta-analyses) guidelines. Searching was conducted across four databases: PubMed, CINAHL, ScienceDirect, and Scopus between 2014 and 2024. The risk of bias and methodological quality of the included studies were assessed using the Joanna Briggs Institute (JBI) critical appraisal checklist. Each study was evaluated independently by two reviewers, and disagreements were resolved through discussion or consultation with a third reviewer. All relevant studies were managed using EndNote software, 21. A narrative synthesis was conducted to identify risk factors of depression. The protocol was registered with PROSPERO (the international prospective register of systematic reviews) (Code: CRD42024555723).

Results: Out of 2457 records yielded from the systematic search, 19 articles were selected to be included in the review, all of which were cross-sectional studies. The identified risk factors for depression were categorized into three main domains: 1) biological factors (including gender, alcohol use behavior, and exposure to negative life events), 2) psychological factors (including mental health conditions, self-directed behaviors, and cognitive functions), and 3) sociological factors (including education level of junior high school or below, parental relationships, experiences of abuse/trauma, and school bullying).

Conclusion: Several risk factors for depression in adolescents with NSSI were identified. In future studies, data from this study can be used to identify risk factors and develop interventions that reduce risk factors leading to depression in NSSI.

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Highlights

- NSSI is a common mental health threat among adolescents, which often co-occurs with symptoms of depression.
- Depression in adolescents with NSSI significantly heightens suicide risk with increased suicidal thoughts, attempts, and behaviors, particularly among those struggling to manage negative emotions.
- Multiple factors, including biological factors, psychological factors, and sociological factors, influence depression among adolescents with NSSI.

Plain Language Summary

Understanding the factors that contribute to depression in adolescents with non-suicidal self-injury (NSSI) is crucial, given the potential long-term impact of overlooking these factors on their future well-being. The present study concluded that the most important factors affecting the depression among adolescents fall into three main categories: Biological (including female gender, alcohol use behavior, and exposure to negative life events), psychological (including mental health condition, self-directed behavior, and cognitive function), and sociological (including education, parental relationships, abuse/trauma, and school bullying).

Introduction

Non-suicidal self-injury (NSSI) is a self-directed action that leads to direct, deliberate destruction or alteration of one's bodily tissue without suicidal intent (Kerr et al., 2010; Muehlenkamp & Brausch, 2019). NSSI is widely recognized as an emotional self-regulation strategy, primarily used to relieve intense negative emotions such as stress, anxiety, depression, anger, and frustration. These emotions typically precede NSSI and are often followed by a temporary sense of relief or calm (Klonsky & Muehlenkamp, 2007).

NSSI typically begins in early adolescence, with the mean onset age of 13 years (Gillies et al., 2018), and emerges during early to middle adolescence, reaching its peak around the ages of 14–15, then gradually declines during late adolescence (Esposito et al., 2023). Previous studies report that NSSI affects 13%–29% of adolescents (Baetens et al., 2021; Muehlenkamp & Brausch, 2019). It is a significant mental health concern in the community and clinical settings, with lifetime prevalence estimates ranging from 17% to 60% (Brown & Plener, 2017). Additionally, depression is highly prevalent among adolescents who engage in NSSI (Barrocas et al., 2015; Kabkumba et al., 2021; Lawrence et al., 2016; Shao et al., 2021; Thai et al., 2021). Depression in adolescents with NSSI can elevate the risk of suicide when they struggle to cope with negative emotions, as

recent studies indicate that those with depression exhibit significantly higher levels of suicidal ideation, attempts, and predicted suicidal behavior over time (Asarnow et al., 2011; Bousoño et al., 2021; Chapman & Dixon-Gordon, 2007; Claes et al., 2010; Thai et al., 2021; Yu et al., 2023).

Currently, numerous studies have investigated the risk factors associated with NSSI among adolescents (Brown & Plener, 2017; Du et al., 2021; Thai et al., 2021). Additionally, systematic reviews and meta-analyses have been conducted to examine factors associated with NSSI in adolescents (Jin et al., 2023; Wang et al., 2022). While NSSI has multiple risk factors, depression may serve as a mediator that intensifies or prolongs NSSI behaviors. Identifying the risk factors contributing to depression in adolescents with NSSI can help both researchers and practitioners develop more effective, tailored interventions. To address this gap, we conducted a systematic review to identify the risk factors of depression among adolescents with NSSI that could be utilized to develop interventions that reduce risk factors leading to depression in NSSI.

Material and Methods

Search strategy

Searching was conducted across four databases, consisting of PubMed, CINAHL, ScienceDirect, and Scopus, from 2014 to 2024. Limiting the review to the past

Table 1. The PECO criteria

PECO Components	Criteria
P (population)	Adolescents with NSSI
E (exposure)	Risk factors for depression
C (comparison)	No comparison
O (outcome)	Depression

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decade ensures that our findings are based on the most up-to-date evidence. We performed a systematic review of the literature, which followed the [preferred reporting items for systematic reviews and meta-analysis \(PRISMA\)](#) guidelines outlined in ([Page et al., 2021](#)). We aimed to answer the PECO criteria to formulate a focused review question, “What are the risk factors for depression among adolescents with NSSI?” ([Table 1](#)).

All retrieved articles were imported into EndNote software, version 21 to identify relevant studies and remove duplicates. We used boolean operators (AND, OR, NOT, or AND NOT) as conjunctions to combine or exclude keywords in our searching ([Table 2](#)).

The study population is adolescents with NSSI who are 10-21 years old and presented with depression ([American Academy of Pediatrics, 2019](#)). No specific intervention was required for inclusion in this review. Studies relevant to non-experimental designs, such as cross-sectional studies, published in English between 2014 and 2024, were included. However, studies were excluded if they were not available in full text, if the sample populations consisted of adults or older people,

or if they were case studies, systematic reviews, or meta-analysis articles.

Data extraction and synthesis

Data extraction and cross-checking were conducted by two authors, who screened the articles by reviewing their design, participants, risk factors, measurements, and main findings to determine if they met the inclusion criteria. After this screening procedure, full-text articles were analyzed in detail for final inclusion, focusing on the relationship between depression and its associated factors. Data were summarized as adjusted odds ratios, and multivariate findings took precedence over unadjusted odds ratios and bivariate results. Any disagreements between the two authors were referred to a third author for a final decision. We conducted a narrative synthesis to identify risk factors of depression. We categorized findings of the included studies into three domains (biological, psychological, and sociological factors), enabling us to identify common risk factors for depression and inconsistencies across studies. To enhance clarity, we developed a summary table to present findings in a structured format.

Table 2. The syntax of searching on databases

Database	Keywords
PubMed	“Depression*” OR “depressive disorder*” AND “non-suicidal self-injury*” OR “non-suicidal*” OR “self-harm*” OR “deliberate self-harm*” OR “NSSI” AND “adolescents*” OR “teenager” OR “Youth” AND “factor” OR “factors related” OR “determinant”.
CINAHL	“Depression*” OR “depressive disorder*” AND “non-suicidal self-injury*” OR “non-suicidal*” OR “self-harm*” OR “deliberate self-harm*” OR “NSSI” AND “adolescents*” OR “teenager” OR “youth” AND “factor” OR “factors related” OR “determinant”.
ScienceDirect	“Depression” OR “depressive disorder” AND “non-suicidal self-injury” OR “non-suicidal” OR “self-harm” OR “deliberate self-harm” OR “NSSI” AND “adolescents” OR “teenager” OR “youth” AND “factor” OR “factors related” OR “determinant”
Scopus	“Depression” OR “depressive disorder” AND “non-suicidal self-injury” OR “non-suicidal” OR “self-harm” OR “deliberate self-harm” OR “NSSI” AND “adolescents” OR “teenager” OR “youth” AND “factor” OR “factors related” OR “determinant”

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Note: Eligibility criteria and study selection. (*) Indicates a search that includes both the singular and plural forms of a word. For example, depression* retrieves results containing both ‘depression’ and ‘depressions’.

Quality assessment

The quality of the studies was assessed by using the Joanna Briggs Institute (JBI) critical appraisal checklist (Moola et al., 2020) for cross-sectional studies. Studies scoring over 70% (6–8 points) were classified as high quality, those scoring between 50% and 70% (4–5 points) as medium quality, and those below 50% (below 4 points) as low quality (Moola et al., 2017).

Results

Following the selection process, 2457 articles were imported into EndNote software, to identify relevant articles and remove duplicates (1431 articles). This process left 1026 potentially relevant sources. Of these, 1007 articles were excluded for various reasons, such as lack of full text, not focusing on adolescents, or being related to other diseases. Finally, 19 articles were selected that satisfied the criteria set forth for this systematic review (Figure 1).

Study characteristics

Nineteen studies met the eligibility criteria. All of these were cross-sectional studies; 13 were conducted in China, 2 in the USA, and 1 study each in Canada, Germany, Belgium, and Turkey. The mean age of adolescent participants ranged from 13.05 to 18.73 years, although three studies did not report the mean age of participants. Additionally, ten studies focused on adolescents in hospital settings, while nine involved adolescents in school communities.

The adolescent's depression had been measured using various measurements, including the Center for epidemiological studies depression scale (CES-D), depressive symptoms scale (DSS), the Beck depression inventory (BDI), the revised child anxiety and depression scale child version (RCADS-C), Hamilton depression scale (HAMD), the patient health questionnaire (PHQ), the depression-anxiety-stress scale (DASS), the children's depression inventory (CDI), the hospital anxiety and depression scale (HADS), the Ko's depression inventory (KDI), the diagnostic and statistical manual of mental disorders (DSM), and the international classification of diseases (ICD) (Table 3).

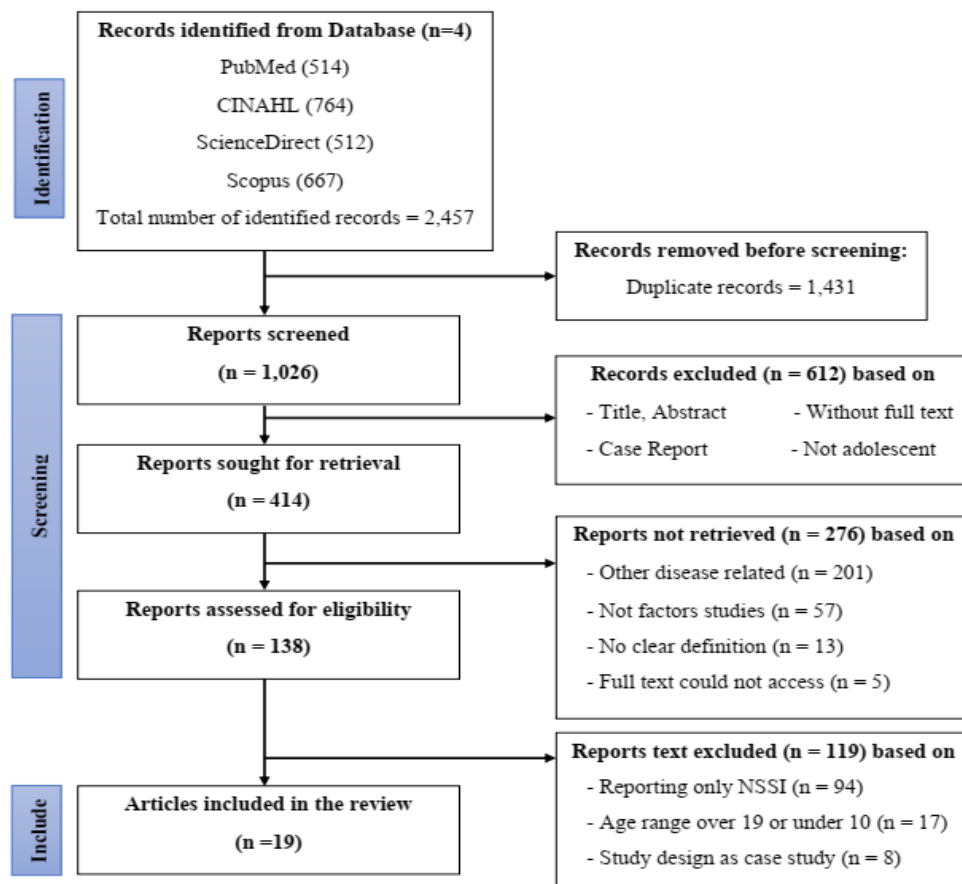


Figure 1. PRISMA flow diagram for literature search

Table 3. Characteristics of the included studies

Authors (y)	Country	Study Design	Aim of the Study	Setting	Sample Size	Gender Ratio (%)	Age Range (Mean±SD)	Measurement of Depression
Ateş et al. (2024)	Turkey	Cross-sectional	To investigate the roles of psychological mindedness and self-compassion among depressed Turkish adolescents with NSSI	Hospital	119	F>M (89.9)	12-18 years (16.02±1.56)	RCADS
Baiden et al. (2017)	Canada	Cross-sectional	To examine the mediating effect of depression associated with bullying victimization among adolescents with NSSI	Community	1650	M>F (54.2)	12-18 years (14.56±1.79)	DSS
Burke et al. (2018)	The USA	Cross-sectional	To examine the trait affect and cognitive affective regulation strategies associated with depressive symptoms, NSSI, and well-being in late adolescents	High school and university	590	F>M NR	NR (18.73±1.4)	BDI
Cao et al. (2024)	China	Cross-sectional	To analyze the relationship of alexithymia, childhood trauma, and body investment to NSSI in adolescents with depression	Hospital	225	F>M (78)	11-19 years (15.5±1.9)	HAMD
Chen et al. (2023a)	China	Cross-sectional	To explore cognitive impairment and factors influencing depression in adolescents with NSSI	Hospital	142	F>M (76.9)	12-18 years (14.9±1.6)	PHQ
Ding et al. (2022)	China	Cross-sectional	To explore the mediating roles of depression and experiential avoidance among adolescents with NSSI	High school	1062	F>M (52.64)	12-16 years (13.05±0.77)	DASS
Ghinea et al. (2021)	Germany	Cross-sectional	To examine differences in psychosocial functioning among adolescent NSSI patients with and without childhood maltreatment	Hospital	2368	F>M (86.92)	12-17 years (14.92±1.43)	CDI
Hu et al. (2021)	China	Cross-sectional	To explore the relationship among self-injury behavior, experiential avoidance, cognitive fusion, anxiety, and depression in Chinese adolescent patients with NSSI	Hospital	120	F>M (60.83)	12-18 years (NR)	HAMD
Lu et al. (2023)	China	Cross-sectional	To investigate the risk factors associated with depression and NSSI among secondary vocational school students	School	1848	F>M (56.6)	16-18 years (NR)	PHQ
Luyckx et al. (2015)	Belgium	Cross-sectional	To explore identity processes and statuses associated with NSSI in school	High school	568	F>M (76.6)	14-19 years (16.13±1.42)	HADS
Ren et al. (2024)	China	Cross-sectional	To explore psychosocial factors among adolescents with NSSI in MDD	Hospital	187	F>M (77.7)	12-23 years (15.9±2.57)	HAMD
Liu et al. (2024a)	China	Cross-sectional	To explore the mediating effect of depression between cumulative ecological risk and adolescents' NSSI	Primary-high School	16508	F>M (52.1)	NR	CES-D

Authors (y)	Country	Study Design	Aim of the Study	Setting	Sample Size	Gender Ratio (%)	Age Range (Mean±SD)	Measurement of Depression
Tang et al. (2022)	China	Cross-sectional	To explore the mediating role of depression between alexithymia and adolescents with NSSI	School	2,170	F>M (51.93)	15-18 years (16.83±0.38)	KDI
Ver-gara et al. (2019)	The USA	Cross-sectional	To identify differences in peer victimization and bullying perpetration among adolescents with NSSI, suicidal behavior, and depression	Hospital	223	F>M (78.9)	13-18 years (15.31±1.34)	CES-D
Wang et al. (2024)	China	Cross-sectional	To explore adverse childhood experiences associated with NSSI in adolescents with depression	Hospital	562	F>M (61.6)	NR	ICD
Wei et al. (2022)	China	Cross-sectional	To explore the moderated mediation model of depression and resilience among adolescents with NSSI who had stressful life events	High School	643	F>M (52.10)	14-17 years (15.91±0.74)	CES-D
Wu et al. (2023)	China	Cross-sectional	To explore the effect of childhood abuse, depression, and self-compassion on Adolescent with NSSI	High school	758	F>M (54.5)	12-19 years (14.16±1.92)	DASS
Chen et al. (2023b)	China	Cross-sectional	To explore borderline personality features, emotion regulation, and NSSI in depressed adolescents	Hospital	1192	F>M (73.6)	12-18 years (15.10±1.63)	DSM
Liu et al. (2024b)	China	Cross-sectional	To explore childhood trauma and school bullying as risk factors for NSSI among adolescents with mood disorders	Hospital	123	F>M (77.2)	12-19 years (15.37±1.72)	ICD

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Abbreviations: CES-D: Center for epidemiological studies depression scale; DSS: Depressive symptoms scale; BDI: The Beck depression inventory; RCADS-C: The revised child anxiety and depression scale, child version; HAMD: Hamilton depression scale; PHQ: The patient health questionnaire; DASS: The depression-anxiety-stress scale; CDI: The children's depression inventory; HADS: The hospital anxiety and depression scale; KDI: The Ko's depression inventory; DSM: The diagnostic and statistical manual of mental disorders; ICD: The international classification of diseases.

Risk of bias

The Joanna Briggs Institute (JBI) critical appraisal checklist for analytical cross-sectional studies was used to evaluate the methodological quality of eligible studies. This assessment checklist has 8 questions and sections to record answers as “yes,” “no,” “unclear,” or “not applicable” (Moola et al., 2017). All studies were classified as high quality. Of the 19 studies, most described the subjects and settings used valid and reliable measurements and applied appropriate statistical analyses to assess outcomes. However, one study did not describe valid and reliable measures, and six studies did not report confounding factors (Table 4).

Risk factors in adolescents with depression and NSSI

This study found that depression among adolescents with NSSI is influenced by multiple factors, including biological, psychological, and sociological factors (Table 5).

Biological factors

Biological factors encompass fundamental biomedical influences, including genetic predispositions, brain structure and function, and neurochemical imbalances, all of which play a significant role in the development of depression. However, these biological processes can be shaped or exacerbated by external factors such as infec-

Table 4. Risk of bias assessment of each study (n=19)

Authors (y)	Criteria of JBI								Overall Appraisal	Quality
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8		
Ateş et al. (2024)	Y	Y	Y	Y	Y	Y	Y	Y	8/8	High
Baiden et al. (2017)	Y	Y	Y	Y	Y	Y	Y	Y	8/8	High
Burke et al. (2018)	Y	Y	Y	Y	Y	Y	Y	Y	8/8	High
Cao et al. (2024)	Y	Y	Y	Y	N	N	Y	Y	6/8	High
Chen et al. (2023a)	Y	Y	Y	Y	N	N	Y	Y	6/8	High
Ding et al. (2022)	Y	Y	Y	Y	Y	Y	Y	Y	8/8	High
Ghinea et al. (2021)	Y	Y	Y	Y	Y	Y	Y	Y	8/8	High
Hu et al. (2021)	Y	N	Y	Y	N	N	Y	Y	6/8	High
Lu et al. (2023)	Y	Y	Y	Y	Y	Y	Y	Y	8/8	High
Luyckx et al. (2015)	Y	Y	Y	Y	N	N	Y	Y	6/8	High
Ren et al. (2024)	Y	Y	N	Y	Y	Y	Y	Y	7/8	High
Liu et al. (2024)	Y	Y	Y	Y	Y	Y	Y	Y	8/8	High
Tang et al. (2022)	Y	Y	Y	Y	Y	Y	Y	Y	8/8	High
Vergara et al. (2019)	Y	Y	Y	Y	N	N	Y	Y	6/8	High
Wang et al. (2024)	Y	Y	Y	Y	N	N	Y	Y	6/8	High
Wei et al. (2022)	Y	Y	Y	Y	Y	Y	Y	Y	8/8	High
Wu et al. (2023)	Y	Y	Y	Y	Y	Y	Y	Y	8/8	High
Chen et al. (2023b)	Y	Y	Y	Y	Y	Y	Y	Y	8/8	High
Liu et al. (2024b)	Y	Y	Y	Y	Y	Y	Y	Y	8/8	High

Y: Low risk of bias; N: High risk of bias.

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tions, injuries, diet, exposure to toxins, or trauma, which may impact mental health (Karunamuni et al., 2021). For instance, genetic predispositions may interact with environmental stressors, such as childhood maltreatment or prolonged emotional trauma, increasing the risk of depression and NSSI. These factors can be further explained as follows.

Gender: Out of the 19 studies, two studies reported that being female increases the risk of depression in adolescents with NSSI (Baiden et al., 2017; Ren et al., 2024), while one study reported that being male increases the risk of depression (Cao et al., 2024).

Behavior of alcohol use: Out of the 19 studies, one study indicated that active drinking alcohol use increases the risk of depression (Cao et al., 2024).

Exposure to negative life events: Out of the 19 studies, one indicated that personal distress and stressful life events increased the risk of depression (Wei et al., 2022).

Psychological factors

Psychological factors refer to internal mental processes, emotions, attitudes, and beliefs that influence an individual's behavior, thoughts, and decision-making (George, 2012). These factors, including coping mechanisms, personality traits, and emotional responses, influence how individuals interact with their environment and experiences. These factors can be explained as follows.

Mental health condition: Out of the 19 studies, four investigated the increased risk of depression among adolescents with borderline personality disorder (Chen et al., 2023a;

Table 5. Summary of risk factors of depression among adolescents with NSSI

Factor			Authors (Year)																		
			Ateş et al. (2024)	Baiden et al. (2017)	Burke et al. (2018)	Cao et al. (2024)	Chen et al. (2023a)	Ding et al. (2022)	Ghinea et al. (2021)	Hu et al. (2021)	Lu et al. (2023)	Luyckx et al. (2015)	Ren et al. (2024)	Liu et al. (2024a)	Tang et al. (2022)	Vergara et al. (2019)	Wang et al. (2024)	Wei et al. (2022)	Wu et al. (2023)	Chen et al. (2023b)	Liu et al. (2024b)
Biological Factor	Gender	Male			+																
		Female		+								+									
	Behavior of alcohol use	Active drinking				+															
	Exposure to negative life events	Personal distress/stressful life event										+					+				
Psychological factor		Borderline personality disorder				+		+		+										+	
		Alexithymia											+								
		Anxiety							+		+										
		Hopelessness				+															
Self-directed behavior		Experiential avoidance					+		+												
		Low self-compassion	+																		
		Self-punishment	+																		
		Emotion dysregulation	+																	+	
		Motor impulsiveness/Impulsiveness										+	+								
Cognitive function		Cognitive impairment							+												
		Rumination		+		+					+										
		Brooding		+																	
		Dampening		+																	
Sociological factor		Education																			
		Junior high school and below				+															
		Cumulative ecological risk (parent, peer, and teacher relationships)											+								

Factor		Authors (Year)																		
		Ateş et al. (2024)	Baiden et al. (2017)	Burke et al. (2018)	Cao et al. (2024)	Chen et al. (2023a)	Ding et al. (2022)	Ghinea et al. (2021)	Hu et al. (2021)	Lu et al. (2023)	Luyckx et al. (2015)	Ren et al. (2024)	Liu et al. (2024a)	Tang et al. (2022)	Vergara et al. (2019)	Wang et al. (2024)	Wei et al. (2022)	Wu et al. (2023)	Chen et al. (2023b)	Liu et al. (2024b)
Parent relationships	Interpersonal boundaries	+																		
	Interpersonal function	+																		
	Caregiver divorce/Family separation															+				
	Childhood maltreatment/Abuse		+		+			+										+		+
Abuse/Trauma	Emotional abuse																			+
	Physical abuse															+				+
	Sexual abuse															+				+
	Physical neglect																			+
	Emotional neglect															+				
School bullying	Verbal bullying																			+
	Relationship bullying														+					+
	Physical bullying																			+
	Cyber-ostracism							+												

Note: + means increase the risk of depression.

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Chen et al., 2023b; Ghinea et al., 2021; Lu et al., 2023), while two studies indicated that anxiety also raises the risk of depression (Hu et al., 2021; Luyckx et al., 2015). Additionally, one study found that alexithymia increases the risk of depression (Tang et al., 2022), and another found that hopelessness increases the risk of depression (Chen et al., 2023a).

Self-directed behaviors: Out of the 19 studies, two investigated that experiential avoidance increased the risk of depression (Ding et al., 2022; Hu et al., 2021), while two studies indicated that emotion dysregulation also raises the risk of depression (Ateş et al., 2024; Chen et al., 2023b). Additionally, two indicated that impulsiveness also increases the risk of depression (Liu et al., 2024; Ren et al., 2024), and another indicated that low self-compassion and self-punishment increase the risk of depression (Ateş et al., 2024).

Cognitive function: Out of the 19 studies, three investigated rumination through increased risk of depression, including brooding and dampening (Burke et al., 2018; Chen et al., 2023a; Luyckx et al., 2015), while one study reported cognitive impairment increased risk of depression (Hu et al., 2021).

Sociological factors

Sociological factors refer to the societal and environmental aspects that shape human behavior, beliefs, and interactions (George, 2012). These factors encompass social structures, cultural norms, and systemic elements, including family, religion, education, socioeconomic status, and community values. These factors can be explained as follows.

Education: Out of the 19 studies, one indicated that adolescents in junior high school or below have an increased risk of depression (Cao et al., 2024).

Cumulative ecological risk: Only one of the 19 studies examined cumulative ecological factors that predicted depression in adolescents with NSSI, including connections between parents and children, peers, and teachers and students (Liu et al., 2024).

Parent relationships: Out of the 19 studies, 5 studies reported that childhood maltreatment or childhood abuse increases the risk of depression (Baiden et al., 2017; Cao et al., 2024; Ghinea et al., 2021; Liu et al., 2024b; Wu et al., 2023). Additionally, one study indicated that caregiver divorce or family separation increases the risk of depression (Wang et al., 2024), and another indicated that interpersonal boundaries and function increase the risk of depression (Ateş et al., 2024).

Abuse/Trauma: Out of the 19 studies, two studies reported that physical and sexual abuse increase the risk of depression (Liu et al., 2024b; Wang et al., 2024). Additionally, one study investigated that emotional neglect increases the risk of depression (Wang et al., 2024), and another identified that emotional abuse and physical neglect increase the risk of depression (Liu et al., 2024b).

School bullying: Out of the 19 studies, three studies indicated that relationship bullying increases the risk of depression (Liu et al., 2024b; Vergara et al., 2019; Wang et al., 2024), while one study identified that cyber-ostracism increases the risk of depression (Ding et al., 2022). Additionally, one study investigated how verbal and physical bullying increases the risk of depression (Liu et al., 2024b).

Discussion

This systematic review explored risk factors associated with depression in adolescents who engage in NSSI. A total of 19 cross-sectional studies among 31058 adolescents with NSSI met the eligibility criteria. The findings indicated that depression risk is influenced by three key domains: Biological factors, including female gender, behavior of alcohol use, and exposure to negative life events; psychological factors, such as pre-existing mental health conditions, psychological distress, and cognitive functioning; and sociological factors, including educational background, parental relationships, experiences of abuse or trauma, and peer bullying. These findings highlight the multifaceted nature of depression risk in this population.

Biological factors

The literature reports that women, in particular, who engage in NSSI are more likely than men to have experienced depression (Baiden et al., 2017; Ren et al., 2024). However, one study reported that being male gender increases the risk of depression (Cao et al., 2024). The reason for the gender differences may be related to the fact that women generally have higher rates of depression and anxiety than men (Hilt et al., 2008). The average age of adolescent participants ranged from 13.05 to 18.73 years. The finding was consistent with the previous review by Cao et al. (2024), who indicated that adolescents in junior high school or below have an increased risk of depression. Similarly, Kessler et al. (2005) explained that mid-adolescent age is a predictor of NSSI across the lifespan, as adolescence is a critical period for human development in lifelong well-being. Still, the risk of poor mental health is found in 50% of all mental disorders beginning by age 14. Moreover, adolescents experiencing personal distress and stressful life events have an increased risk of depression (Ren et al., 2024; Wei et al., 2022). This finding is consistent with the findings of Baetens et al. (2021), who reported that the presence of depression in adolescents with NSSI is associated with an increased likelihood of experiencing stressful life events. Adolescents engaging in NSSI may be more susceptible to interpersonal conflicts, including arguments with parents, teachers, friends, or romantic partners. Additionally, these findings align with previous research suggesting that depression may serve as a mechanism linking stressful life events to NSSI in adolescents (Burke et al., 2015; Liu et al., 2021).

Psychological factors

This review found that psychological factors are strongly associated with depression in adolescents with NSSI, which is often used to regulate distressing emotions, manage stress, or self-punishment. It may also serve as an outlet for self-directed anger, self-blame, and perceived social transgressions (Chapman & Dixon-Gordon, 2007; Klonsky & Muehlenkamp, 2007). Additionally, mental health condition increases the risk of depression, such as borderline personality disorder, anxiety, alexithymia, and hopelessness (Chen et al., 2023a; Chen et al., 2023b; Ghinea et al., 2021; Hu et al., 2021; Lu et al., 2023; Luyckx et al., 2015; Tang et al., 2022). The findings align with previous studies that highlighted how depression among adolescents with NSSI may be linked to other mental health conditions, particularly in those who struggle with mood regulation (Andover & Gibb, 2010; Whitlock et al., 2014). NSSI is often car-

ried out as an attempt to avoid interpersonal interactions. Individuals with mood disorders who engage in NSSI frequently have a history of poor or negative relationships, exhibit impulsiveness, and experience low self-compassion, which may also engage in self-punishment, as shown in previous findings.

Cognitive function, including rumination thought, brooding, dampening, and cognitive impairment, is associated with depression (Burke et al., 2018; Chen et al., 2023a; Hu et al., 2021; Luyckx et al., 2015). The response style theory developed by Nolen-Hoeksema (1991) explains that an individual's response to distractions can lead to depression, particularly in those with a tendency to ruminate. Rumination involves repetitive, negative thoughts that prolong distress and increase the risk of depression more than in individuals who do not engage in such thinking patterns.

Sociological factors

The findings highlight cumulative ecological risks, including poor parent-child relationships, adverse family life events, academic challenges, teacher-student relationships, and peer relationships (Liu et al., 2024a). Sociological factors, including parent relationships, abuse, and school bullying, were identified as risk factors for depression. This systematic review indicates that childhood maltreatment or abuse, caregiver divorce or family separation, and interpersonal boundary issues increase the risk of depression (Ateş et al., 2024; Baiden et al., 2017; Cao et al., 2024; Ghinea et al., 2021; Liu et al., 2024b; Wang et al., 2024; Wu et al., 2023). This finding may be because childhood abuse is often associated with long-term emotional dysfunction. Adolescents with a history of childhood abuse tend to struggle with affect and emotion regulation and may experience a sense of insecurity, which can consequently lead to NSSI (Santangelo et al., 2016).

Moreover, being abused from childhood trauma such as physical abuse, sexual abuse, emotional abuse, emotional neglect, and physical neglect is a risk factor for depression (Liu et al., 2024b; Wang et al., 2024). It suggests that victims of sexual abuse often experience a profound sense of betrayal and depersonalization, which can lead to maladaptive strategies for regulating emotions in an attempt to reduce emotional distress (Lu et al., 2023). Moreover, physical abuse significantly affects adolescents with depression who engage in NSSI, as these adolescents often have limited emotion regulation skills. The negative emotions stemming from physical abuse may lead them to use NSSI as a quick way to regu-

late their emotions (Chapman & Dixon-Gordon, 2007). These findings confirm that a sense of loss and helplessness when witnessing caregivers being treated violently contribute to various mental health issues, such as depression, which were identified as predictors of NSSI.

School bullying by peers, such as relationship bullying, cyber-ostracism, and verbal and physical bullying, is found to be a risk factor for depression (Ding et al., 2022; Liu et al., 2024b; Wang et al., 2024). This finding suggests that experiencing school bullying can be a significant stressor that leads to an accumulation of depression, potentially resulting in self-injurious behavior as a form of emotional relief (Ford & Gómez, 2015). Similarly, adolescents who are victims of school bullying may experience depression and engage in self-harm as a coping mechanism or form of self-punishment (Nguyen et al., 2020).

This study has some limitations. The inclusion criteria are limited to English-language publications from 2014 to 2024, which may introduce selection bias. Furthermore, some studies did not provide the average age of participants, which could potentially impact the results, as adolescence is divided into three stages: Early, middle, and late adolescence, each with distinct developmental characteristics. Specifying the average age could help clarify which stage of adolescence is most associated with NSSI and an increased risk of developing depression. Moreover, the measurement of depression differed among studies, with some using a wide range of scores that might also include other disorders such as anxiety and stress. This may lead to variability in measuring depression due to the influence of comorbid conditions.

Conclusion

The findings are classified into three categories of factors associated with depression among adolescents with NSSI. These are biological factors, consisting of gender, behavior of alcohol use, and exposure to negative life events; psychological factors, consisting of mental health conditions, psychological behaviors, and cognitive function; and sociological factors, consisting of education, parent relationships, experiences of abuse or trauma, and school bullying.

Ethical Considerations

Compliance with ethical guidelines

The study protocol was registered with the international prospective register of systematic reviews (PROSPERO) (Code: CRD42024555723).

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Authors' contributions

Investigation, data collection, and validation: Russunan Jantarapakdee and Ratchaneekorn Upasen; Data analysis and writing: Russunan Jantarapakdee and Penpaktr Uthis; Final approval: All authors.

Conflict of interest

The authors declared no conflict of interest.

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