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Adverse childhood experiences (ACEs), resilience, and outcomes in older adulthood: A scoping review

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ABSTRACT

Background: Previous research has demonstrated a dose-response relationship between exposure to adverse childhood experiences (ACEs) and adverse outcomes in adulthood. Despite widely known associations, previous reviews have primarily focused on outcomes in younger and middle-aged adults exposed to ACEs to the exclusion of older adults and do not consider the potential role of resilience for understanding outcomes in older adulthood.

Objective: The present scoping review aimed to examine the extent and nature of existing literature on the influence of ACEs and resilience on the cognitive, physical, mental, and social health outcomes among older adults.

Methods: We conducted a search of five electronic databases (CINAHL, MEDLINE, PsycINFO, AgeLine, Scopus) using the following keywords: adversity, resilience, aging, and older adults. We limited our inclusion criteria to works published in English or French after 1998 as Felitti et al. published the first study describing ACEs in this year.

Results: Of the 4926 studies screened, 27 studies met the inclusion criteria. Overall, results from the included studies indicated that exposure to adversity during childhood was associated with worse outcomes in older adulthood. Additionally, we found that resilience and resiliency-related factors (e.g., problem-focused coping strategies) mitigated or reduced harms associated with ACEs to improve outcomes in older adulthood.

Conclusions: Exposure to ACEs is associated with reduced functioning in later adulthood. Findings from this review indicate a need for further exploration into the role of ACEs, and the potential effects of resilience, on health outcomes in older adults to develop better individual- and population-level interventions for this group.

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1. Introduction

1.1. Adverse childhood experiences

Over time, the types of childhood experiences categorized as adverse have increased beyond domestic violence and physical abuse. We now define adverse childhood experiences (ACEs) as any harmful event that occurred in one's social or familial environment during childhood that has the potential to disrupt the child's development (Kalmakis & Chandler, 2013). For the purpose of the current review, a comprehensive range of adverse childhood experiences, encompassing those defined by the World Health Organization (WHO; e.g., physical, emotional, and sexual abuse; physical and emotional neglect; witnessing domestic violence; parental separation or divorce; parental incarceration; collective or community violence; bullying; childhood illness; poverty; parental mental illness; and parental substance misuse), were included to provide a thorough examination of the impact of childhood adversity (WHO, 2020).

We understand that events in childhood have the potential to influence outcomes throughout the lifespan (Bauldry et al., 2012; Springer, 2009). Studies have shown that, in addition to the directly harmful effects, such as immediate and short-term injury or illness, ACEs can have long-term consequences and reduce the likelihood of healthy aging (i.e., maintaining functional ability that can enable well-being in old age; Joshi et al., 2021; WHO, 2022). Researchers have found that exposure to a single ACE has the potential to negatively impact outcomes in adulthood, and exposure to four or more ACEs before the age of 18 years creates a greater risk of adverse outcomes in adulthood (Hall et al., 2021; Schilling et al., 2007). Researchers have also found that exposure to adversity during childhood has the potential to influence physical, cognitive, mental, and social health outcomes in adulthood (Brown et al., 2009; Campbell et al., 2016; Kalmakis & Chandler, 2013; Lee et al., 2020). More specifically, exposure to ACEs has been shown to increase the risk of poorer physical health outcomes (e.g., cancer, chronic lung disease, coronary heart disease, diabetes, liver disease, obesity, premature death; Felitti et al., 1998; Hughes et al., 2017; Wegman & Stetler, 2009), worse cognitive health outcomes (e.g., impaired memory of childhood experiences, impaired pattern recognition memory tasks, impaired spatial working memory; Anda et al., 2006; Majer et al., 2010), worse mental health outcomes (e.g., anxiety, depression, posttraumatic stress disorder; Anda et al., 2006; Edwards et al., 2003; Green et al., 2010; Nurius et al., 2015; Salinas-Miranda et al., 2015), and worse social health outcomes (e.g., increased feelings of emotional isolation, reduced family closeness, smaller social networks; Savla et al., 2013; Wilson et al., 2006).

1.2. Resilience

The association between ACEs and long-term adverse outcomes, however, is not a one-to-one relationship. Long-term adverse outcomes associated with ACEs lie on a spectrum; some individuals overcome adversity to age healthily, whereas others may struggle and experience persistent poor health because of exposure to ACEs. Those in the former category demonstrate resilience. We commonly understand resilience as the ability to 'bounce back' from adverse experiences; however, the nature of resilience is far more complex than any one definition can reflect (Babić et al., 2020; Southwick et al., 2014). We can view resilience as a trait, process, or outcome that has the potential to change over time because of individuals' life experiences (Southwick et al., 2014). We can also understand resilience as a stable trajectory of health, with Bonanno (2004) characterizing a resilience trajectory as a brief period of disequilibrium in response to a stressor followed by continued health. Yehuda et al. (2013), on the other hand, argue that human beings are more complex, and instead suggests that we should understand resilience as a process of moving forward from adversity despite initially experiencing negative outcomes because of adversity. Additionally, it is important to consider the multiple domains of functioning present in individuals and acknowledge that survivors of adversity may vary across the different domains of functioning. Masten (2014), for example, takes a systems-oriented approach in defining resilience and defines the concept as the capacity to adapt successfully to disturbances that threaten the viability, the function, or the development of that system. While recognizing that this single definition may not entirely capture the multifaceted nature of the term, Cosco et al.'s (2017) definition of resilience guided this scoping review as it most adequately explained the concept of resilience from a lifespan perspective. That is, Cosco et al. (2017) define resilience individuals as "individuals that exhibit greater levels of functioning than would be expected given their level of adversity experienced demonstrate resilience" (p. 581).

Resilience mitigates the potential negative impact of ACEs on overall health in adulthood through influencing an individual's ability to engage in healthy coping strategies (Elliot et al., 2005; Hall et al., 2021; Hildon et al., 2008; Ungar, 2013; van Kessel, 2013). The literature identifies two primary coping strategies: problem-focused and avoidant emotion-focused coping (Lazarus & Folkman, 1984; Poole et al., 2017; Sheffler et al., 2019; Suls & Fletcher, 1985). Problem-focused coping allows the individual to identify the stressor and develop concrete solutions to resolve the problem while also building a sense of self-efficacy (Poole et al., 2017; Sheffler et al., 2019). In contrast, avoidant emotion-focused coping can be detrimental. Avoidance limits exposure to positive and new learning experiences, and the emphasis on emotions (which are difficult to change directly, especially without the assistance of a trained therapist) does not allow the individual to respond to the stressor in a manner that resolves the problem (Lazarus & Folkman, 1984; Suls & Fletcher, 1985). Individuals typically develop a range of healthy problem-focused (e.g., caring for others) and unhealthy avoidant emotion-focused (e.g., addictive behaviours) coping strategies following exposure to ACEs (Wadsworth, 2015), but exposure to ACEs has been associated with increased use of poor coping mechanisms and participation in risky health behaviours (e.g., risky use of alcohol, cannabis, and tobacco; Mersky et al., 2013; Campbell et al., 2016; Wade et al., 2015).

1.3. Older adults

Older adults (i.e., individuals aged 65 years and over; United Nations, n.d.) may be particularly vulnerable to negative health

outcomes associated with ACEs given the higher likelihood of multiple exposures related to social change (e.g., social norms around domestic violence; Joshi et al., 2021) combined with aging-related reductions in functioning (Majnarić et al., 2021). As the stigma surrounding the experiences of childhood adversity and abuse continues to fade, reporting of these adverse experiences may increase. Older adults therefore represent a natural source of inquiry for coping and resilience given changing circumstances over time and greater likelihood of unreported ACEs and other traumatic experiences over the lifespan (Joshi et al., 2021). In fact, two-thirds of Canadians aged 45 to 85 years old have been exposed to at least one adverse event, including childhood abuse, neglect, domestic violence, or other adversity within the home (Joshi et al., 2021). Older adults also typically experience gradual (and not so gradual) shifts in autonomy, cognition, and mobility (Harada et al., 2013; Lothian & Philp, 2001; Maresova et al., 2023), which may change their ability to engage in previous coping strategies. Moreover, risk of elder abuse, ageism and age-related adversity, grief and loss, and lack of resources may hinder resilience and coping (Ribeiro-Goncalves et al., 2023).

The effects of ACEs are far-reaching and can significantly hinder functioning into older adulthood. Healthcare policy decision-makers, practitioners, and researchers working with older adults must consider the role of ACEs (and their connection to social determinants of health) to ensure equitable access to care options, with opportunities to enhance resilience and engage in healthy coping. Our understanding of the impact of ACEs and resilience on adult health outcomes, however, is mostly limited to studies of younger and middle-aged adult populations (Godoy et al., 2021; Kalmakis & Chandler, 2015; Wiss & Brewerton, 2020). As the Canadian and global population continues to age (Tam, 2020), the role of ACEs (and the ways in which individuals bounce back from ACEs; i.e., resilience) on older adult health outcomes needs to be further clarified.

1.4. Current review

For the current review, we conducted a preliminary search of PROSPERO, MEDLINE, the Cochrane Database of Systematic Reviews, and the *JBI Database of Systematic Reviews and Implementation Reports*. We did not identify any current or in progress reviews on the topic. Thus, the purpose of this scoping review was to evaluate the extent and nature of existing literature on outcomes associated with ACEs and resilience among older adults. The first aim was to examine the extent to which research has examined the influence of ACEs and resilience on cognitive, physical, mental, and social health outcomes in older adults. The second aim was to characterize the relationship between ACEs, resilience, and older adult cognitive, physical, mental, and social health outcomes.

Review Questions

1. What is the extent and nature of existing literature on outcomes associated with adverse childhood experience (ACEs) and resilience among older adults?
2. What is the relationship between ACEs, resilience, and older adult health outcomes?

1.5. Inclusion criteria

1.5.1. Participants

This scoping review considered studies that included older adults from both clinical and community samples. The WHO organization defines older adults as those individuals aged 60 years or older (WHO, 2022). However, to ensure a comprehensive and inclusive representation of the older adult population, the current study considered those at least 55 years of age to be older adults. For this reason, to consider a study that included older adults, at least 50 % of the sample had to be at least 55 years of age or the mean age of the sample needed to be at least 55 years by the time the most recent data collection period had occurred.

1.5.2. Concept

We included studies in this scoping review if they reported the use of at least one measure of ACEs and at least one outcome measure associated with ACEs or resilience measures. Measures of ACEs could include one or more of the ACEs identified by the WHO (2016): physical, emotional, and sexual abuse; physical and emotional neglect; witnessing domestic violence; parental separation or divorce; parental incarceration; and collective or community violence. In line with Cosco et al. (2017), we conceptualized resilience as exhibiting greater levels of functioning than would be expected given the level of adversity experienced. We conceptualized outcomes broadly and therefore included physical, cognitive, mental, and social health outcomes.

1.5.3. Context

We included studies published or made available in English or French on or after 1998. We chose this year as Felitti et al. (1998) published the original ACEs study in this year.

2. Methods

We conducted this scoping review in accordance with the Joanna Briggs Institute (JBI) methodology for scoping reviews (Peters et al., 2020) and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) checklist (Tricco et al., 2018). The protocol for this scoping review was pre-registered with Open Science Framework (https://osf.io/tpef7).

2.1. Search strategy

The search strategy aimed to locate published and unpublished primary studies and reviews. An initial limited search of MEDLINE (Ovid) to identify relevant studies. With the help of a health sciences librarian, we developed a full search strategy using the keywords

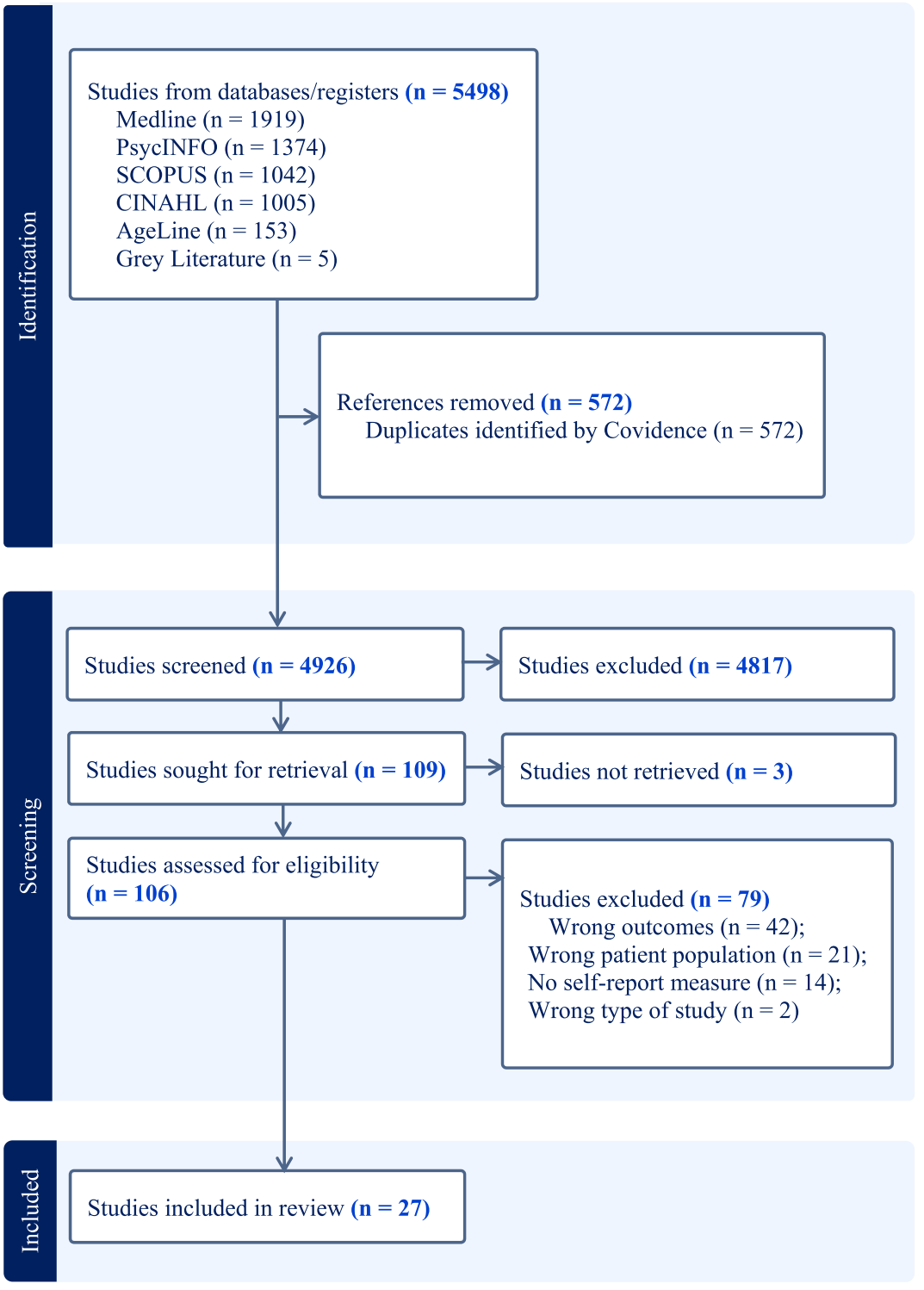

Fig. 1. PRISMA flow diagram.

contained in the titles and abstracts of relevant studies and the index terms used to describe these studies. The search strategy was adapted for CINAHL with Full Text (EBSCOhost), PsycINFO (Ovid), AgeLine (EBSCOhost), and Scopus. We retrieved grey literature (non-peer reviewed literature) from Web of Science Conference Proceedings, ProQuest Theses & Dissertations, and various aging websites. We conducted the original full search on July 8, 2021, and to retrieve any studies published since the original full search, we conducted an updated full search on February 4, 2023. The MEDLINE (Ovid) search strategy is available in Appendix 1.

Table 1
Summary of study characteristics.

Reference	Country	Study design	Sampling	Sample size	Age
Atkinson et al. (2021)	Canada	Longitudinal Cohort Study	CLSA	*N* = 27,170	*Range:* 45 to 84 years old
Hu (2021)	China	Longitudinal Cohort Study	CHARL Study	*N* = 9248	*Range:* At least 60 years old *Mean* = 68.4 years
Ding and He (2021)	China	Longitudinal Cohort Study	CHARL Study	*N* = 23,807	*Range:* At least 45 years old *Mean* = 59 years
Klopack et al. (2022)	United States	Cross-Sectional Cohort Study	HRS	*N* = 2672	*Range:* 50 to 97 years old *Mean* = 68.98 years (*SD* = 9.20 years) *Median* = 67 years
Kok et al. (2017)	The Netherlands	Longitudinal Cohort Study	LASA	*N* = 2185	*Range:* 55 to 85 years
Korten et al. (2014)	The Netherlands	Longitudinal Cohort Study	LASA	*N* = 1312	*Range:* 65 to 85 years *Mean at baseline* = 75.2 years (*SD at baseline* = 6.42 years) *Mean at follow up* = 82.8 years (*SD at follow up* = 5.54 years)
Koyama et al. (2022)	Japan	Cross-Sectional Cohort Study	NEIGE Study	*N* = 491	*Range:* 65 to 84 years
Lau et al. (2018)	Albania Brazil Canada Columbia	Longitudinal Cohort Study	IMISA	*N* = 1506	*Range:* 65 to 74 years
Li and Xiang (2022)	China	Longitudinal Cohort Study	CHARL Study	*N* = 6518	*Range:* At least 60 years old *Mean* = 68.13 years
Lin et al. (2022)	China	Longitudinal Cohort Study	CHARL Study	*N* = 6466	*Range:* 45 to 97 years old *Mean at baseline* = 57.2 years (*SD at baseline* = 8.3 years)
Maier et al. (2022)	Germany	Cross-Sectional Cohort Study	CELLO	*N* = 185	*Mean* = 80.39 years (*SD* = 3.78 years)
McLafferty et al. (2021)	Ireland	Cross-Sectional Cohort Study	NIVHWS	*N* = 656	*Range:* 25 to 99 years *Mean* = 56 years (*SD* = 10.9 years)
Mosley-Johnson et al. (2019)	United States	Longitudinal Cohort Study	MIDUS	*N* = 6323	*Median* = 46 years
Nilaweera et al. (2022)	France	Longitudinal Cohort Study	ESPRIT	*N* = 1562	*Range:* At least 65 years old
Nishio et al. (2022)	Japan	Longitudinal Cohort Study	JAGES	*N* = 5671	*Range:* At least 65 years old *Mean* = 75.08 years (*SD* = 5.28 years)
O'Shea et al. (2021)	England	Longitudinal Cohort Study	ELSA	*N* = 5223	*Range:* At least 54 years old *Mean at baseline* = 68 years (*SD at baseline* = 9 years)
Ritchie et al. (2011)	France	Longitudinal Cohort Study	ESPRIT	*N* = 1282	*Range:* At least 66 years old
Rohner et al. (2022)	Ireland	Cross-Sectional Qualitative Study	Other	*N* = 29	*Range:* At least 50 years old *Mean* = 59.31 years (*SD* = 7.19 years)
Sheffler et al. (2019)	United States	Longitudinal Cohort Study	MIDUS	*N* = 3294	*Range:* 25 to 74 years *Mean at baseline* = 46.4 years (*SD at baseline* = 13 years)
Sosnowski et al. (2019)	United States	Longitudinal Cohort Study	VATSPSUD	*N* = 99	*Range:* 35 to 70 years *Mean* = 52.74 years (*SD* = 8.55 years)
Spencer-Hwang et al. (2018)	United States	Cross-Sectional Qualitative Study	Other	*N* = 36	*Range:* 65 to 102 years
Thoma et al. (2022)	Switzerland	Cross-Sectional Case-Control Study	Other	*N* = 257	*Range:* 51 to 92 years old *Mean* = 71 years
Tjoelker et al. (2022)	The Netherlands	Cross-Sectional Cohort Study	ROM–GPS	*N* = 179	*Range:* 60 to 88 years old
van Assche et al. (2020)	Belgium	Cross-Sectional Quantitative Study	Other	*N* = 81	*Range:* 62 to 90 years old *Mean* = 74.90 years (*SD* = 6.64 years)
Xiang et al. (2022)	United States	Longitudinal Cohort Study	HRS	*N* = 15,133	*Range:* At least 51 years old at baseline *Mean* = 66.5 years
Yuan et al. (2022)	China	Longitudinal Cohort Study	CHARL Study	*N* = 7222	*Range:* At least 60 years old
Zheng et al. (2022)	China	Longitudinal Cohort Study	CHARL Study	*N* = 4440	*Range:* At least 45 years old *Mean* = 58.6 years (*SD* = 8.8 years)

2.2. Study selection

Following the search, we imported all identified records into EndNote (version x9; Clarivate Analytics, Philadelphia, PA, USA) and removed all duplicates (Bramer et al., 2016). We exported search results to Covidence (Veritas Health Innovation, Melbourne, Australia). Pairs of reviewers screened titles and abstracts and reviewed full texts to determine if they met the above-mentioned inclusion criteria. We resolved disagreements through consensus between the pairs of reviews.

2.3. Data extraction

Pairs of independent reviewers extracted data from each study and charted this data into a Microsoft Word document. Data extracted from each study included the country of origin, the type of study, the ACEs measured, measures of ACEs, measures of resilience, health outcome measures, associations between ACEs or resilience and health outcomes, and recommendations for future research.

2.4. Data analysis & presentation

We illustrated our study selection with a PRISMA flow diagram. We then presented findings from the data extraction in tabular format in a manner that aligns with the objective of this scoping review and included a narrative summary to describe how the findings relate to the review questions.

3. Results

3.1. Study inclusion

After removing duplicates, we identified 4926 studies. After title and abstract screening, we excluded 4747 studies. After full text review, we excluded another 76 studies. Of these studies, we excluded 42 studies that did not any outcomes associated with ACEs or resilience, 21 studies that did not focus on older adults, 14 studies that did not employ a self-report measure of ACEs or resilience, 3 studies that did not have a full-text available, and 2 studies that were of an incorrect study type. After full text review, we included a total of 27 studies that met our inclusion criteria. Fig. 1 presents a PRISMA flow diagram of the search strategy, title and abstract screening, and full text review stages of the scoping review.

3.2. Study characteristics

We present in Table 1 and describe below a summary of the characteristics of studies included in this scoping review.

3.2.1. Year of publication

Studies included in this review were published over the course of eleven years from 2011 to 2022. The number of publications per year remained stable, ranging from no to two publications per year, up until the most recent couple of years. A total of six of our included studies were published in 2021 and another twelve of our included studies were published in 2022.

3.2.2. Country

Of the included studies, data was collected in China ($N = 6$), the United States ($N = 6$), the Netherlands ($N = 3$), England ($N = 2$), Ireland ($N = 2$), Japan ($N = 2$), Belgium ($N = 1$), Canada ($N = 1$), France ($N = 1$), Germany ($N = 1$), and Switzerland ($N = 1$). One study collected data in four countries, including Albania, Brazil, Canada, and Columbia.

3.2.3. Study design

Most studies used a longitudinal cohort study design ($N = 18$) followed by a cross-sectional cohort study design ($N = 5$). Two studies employed a cross-sectional qualitative study design, one study employed a cross-sectional case-control study, and one study employed a cross-sectional observational study design.

3.2.4. Sampling

Most studies conducted a secondary analysis on nationally representative data sets ($N = 23$). Of the studies conducting secondary data analyses, the most commonly used data sets were the China Health and Retirement Longitudinal (CHARL) Study ($N = 6$), Health and Retirement Study ($N = 2$), Longitudinal Aging Study Amsterdam ($N = 2$), Midlife Development in the United States (MIDUS; $N = 2$), and Enquête de Santé Psychologique—Risques, Incidence et Traitement (ESPRIT; $N = 2$). Moreover, each of the following data sets were used by one of the included studies: Canadian Longitudinal Study of Aging, Childhood Escape–Late Life Outcomes (CELLO), English Longitudinal Study of Aging (ELSA), International Mobility Study in Aging, Japan Gerontological Evaluation Study (JAGES), Neuron to Environmental Impact across Generations (NEIGE) Study, Northern Ireland Veterans' Health and Wellbeing Study (NIVHWS), Routine Outcome Monitoring for Geriatric Psychiatry and Science (ROM–GPS), and Virginia Adult Twin Study for Psychiatric Substance Use Disorders (VATSPSUD). The remaining studies conducted their analyses on data primarily collected locally by the authors ($N = 4$).

3.2.5. Sample size

With a mean sample size of 4927.67 and a standard deviation of 6936.94, sample sizes from included studies varied widely. Sample sizes ranged from 29 participants to 27,170 participants. Only four studies, two of which were qualitative in nature, included fewer than 100 participants. Another four studies included between 100 and 499 participants in their sample. Nine studies had sample sizes between 500 and 4999 participants, and another ten studies had samples sizes beyond 5000 participants.

Table 2
Summary of ACEs measured in included studies.

ACEs	References
Physical abuse ($N = 19$)	Atkinson et al. (2021); Ding and He (2021); Klopack et al. (2022); Koyama et al. (2022); Lau et al. (2018); Li and Xiang (2022); Lin et al. (2022); McLafferty et al. (2021); Mosley-Johnson et al. (2019); Nishio et al. (2022); O'Shea et al. (2021); Ritchie et al. (2011); Sheffler et al. (2019); Spencer-Hwang et al. (2018); Thoma et al. (2022); Tjoelker et al. (2022); van Assche et al. (2020); Xiang et al. (2022); Yuan et al. (2022)
Parental death or loss ($N = 18$)	Atkinson et al. (2021); Hu (2021); Ding and He (2021); Klopack et al. (2022); Kok et al. (2017); Korten et al. (2014); Koyama et al. (2022); Li and Xiang (2022); Lin et al. (2022); Maier et al. (2022); Nilaweera et al. (2022); Nishio et al. (2022); O'Shea et al. (2021); Ritchie et al. (2011); Sheffler et al. (2019); Spencer-Hwang et al. (2018); Yuan et al. (2022); Zheng et al. (2022)
Parental mental illness ($N = 13$)	Atkinson et al. (2021); Hu (2021); Ding and He (2021); Koyama et al. (2022); Li and Xiang (2022); Lin et al. (2022); McLafferty et al. (2021); Mosley-Johnson et al. (2019); Nishio et al. (2022); O'Shea et al. (2021); Ritchie et al. (2011); Spencer-Hwang et al. (2018); Yuan et al. (2022)
Parental substance misuse ($N = 13$)	Hu (2021); Ding and He (2021); Klopack et al. (2022); Korten et al. (2014); Lau et al. (2018); Li and Xiang (2022); Lin et al. (2022); McLafferty et al. (2021); Mosley-Johnson et al. (2019); O'Shea et al. (2021); Spencer-Hwang et al. (2018); Xiang et al. (2022); Yuan et al. (2022)
Emotional abuse ($N = 12$)	Atkinson et al. (2021); Koyama et al. (2022); McLafferty et al. (2021); Mosley-Johnson et al. (2019); Nishio et al. (2022); Ritchie et al. (2011); Sheffler et al. (2019); Spencer-Hwang et al. (2018); Thoma et al. (2022); Tjoelker et al. (2022); van Assche et al. (2020); Yuan et al. (2022)
Childhood poverty ($N = 11$)	Ding and He (2021); Klopack et al. (2022); Korten et al. (2014); Lau et al. (2018); Mosley-Johnson et al. (2019); Nilaweera et al. (2022); Nishio et al. (2022); Ritchie et al. (2011); Sheffler et al. (2019); Spencer-Hwang et al. (2018); Xiang et al. (2022)
Parental divorce or separation ($N = 11$)	Atkinson et al. (2021); Hu (2021); Klopack et al. (2022); Kok et al. (2017); Koyama et al. (2022); Li and Xiang (2022); Lin et al. (2022); McLafferty et al. (2021); Nishio et al. (2022); Sheffler et al. (2019); Yuan et al. (2022)
Domestic violence ($N = 9$)	Atkinson et al. (2021); Ding and He (2021); Koyama et al. (2022); Lau et al. (2018); Li and Xiang (2022); Lin et al. (2022); McLafferty et al. (2021); Yuan et al. (2022); Zheng et al. (2022)
Sexual abuse ($N = 9$)	Atkinson et al. (2021); Korten et al. (2014); McLafferty et al. (2021); Ritchie et al. (2011); Sheffler et al. (2019); Sosnowski et al. (2019); Thoma et al. (2022); Tjoelker et al. (2022); van Assche et al. (2020)
Parental socioeconomic status ($N = 8$)	Ding and He (2021); Klopack et al. (2022); Kok et al. (2017); Korten et al. (2014); Lau et al. (2018); Mosley-Johnson et al. (2019); Sheffler et al. (2019); Xiang et al. (2022)
Childhood bullying ($N = 7$)	Hu (2021); Ding and He (2021); Li and Xiang (2022); Lin et al. (2022); Ritchie et al. (2011); Yuan et al. (2022); Zheng et al. (2022)
Emotional neglect ($N = 7$)	Koyama et al. (2022); Li and Xiang (2022); Lin et al. (2022); Thoma et al. (2022); Tjoelker et al. (2022); van Assche et al. (2020); Yuan et al. (2022)
Separation from parent or important other ($N = 7$)	Klopack et al. (2022); Maier et al. (2022); Mosley-Johnson et al. (2019); O'Shea et al. (2021); Ritchie et al. (2011); Rohner et al. (2022); Spencer-Hwang et al. (2018)
Neglect, general ($N = 6$)	Atkinson et al. (2021); Hu (2021); Ding and He (2021); McLafferty et al. (2021); Ritchie et al. (2011); Rohner et al. (2022)
Childhood illness ($N = 5$)	Hu (2021); Ding and He (2021); Korten et al. (2014); Nilaweera et al. (2022); Ritchie et al. (2011)
Conflict at home ($N = 5$)	Kok et al. (2017); Korten et al. (2014); Nilaweera et al. (2022); Ritchie et al. (2011); Zheng et al. (2022)
Parental involvement in criminal activities ($N = 5$)	Hu (2021); Li and Xiang (2022); Lin et al. (2022); McLafferty et al. (2021); Yuan et al. (2022)
Worse household income than others ($N = 5$)	Hu (2021); Ding and He (2021); Mosley-Johnson et al. (2019); Sheffler et al. (2019); Spencer-Hwang et al. (2018)
Death of an important other ($N = 4$)	Korten et al. (2014); Li and Xiang (2022); Maier et al. (2022); Spencer-Hwang et al. (2018)
War experiences ($N = 4$)	Korten et al. (2014); Maier et al. (2022); Nilaweera et al. (2022); Ritchie et al. (2011)
Witnessing community violence ($N = 4$)	Maier et al. (2022); O'Shea et al. (2021); Spencer-Hwang et al. (2018); Yuan et al. (2022)
Lack of affection or felt unloved ($N = 3$)	Hu (2021); McLafferty et al. (2021); Nishio et al. (2022)
Physical neglect ($N = 3$)	Thoma et al. (2022); van Assche et al. (2020); Yuan et al. (2022)
Abuse, general ($N = 2$)	Nilaweera et al. (2022); Rohner et al. (2022)
Living in a residential institution ($N = 2$)	Klopack et al. (2022); O'Shea et al. (2021)
Natural disasters ($N = 2$)	Nilaweera et al. (2022); Ritchie et al. (2011)
Parental illness ($N = 2$)	Hu (2021); Nilaweera et al. (2022)
Single-parent household ($N = 2$)	Mosley-Johnson et al. (2019); O'Shea et al. (2021)
Unsafe neighbourhood ($N = 2$)	Li and Xiang (2022); Lin et al. (2022)
Authoritarian education ($N = 1$)	Nilaweera et al. (2022)
Excessive sharing of parental problems ($N = 1$)	Ritchie et al. (2011)
Friendless childhood ($N = 1$)	Zheng et al. (2022)
Parental disability ($N = 1$)	Hu (2021)
Involvement in criminal activities ($N = 1$)	Xiang et al. (2022)
Refugee status ($N = 1$)	Spencer-Hwang et al. (2018)
Repeated school year ($N = 1$)	Xiang et al. (2022)

3.2.6. Age

All studies reported the range, mean (and standard deviation), and/or median ages of participants at baseline and/or follow-up. Twenty-five studies included age ranges, with minimum ages of participants of at least 25 to 29 years ($N = 2$), 35 to 44 years ($N = 1$), 45 to 54 years ($N = 9$), 55 to 64 years ($N = 6$), and 65 years or more ($N = 7$). Maximum ages of participants were not always reported, but of those that did report maximum ages ($N = 14$), these ages ranged from 70 to 102 years. Mean age in years ($N = 17$) ranged from 46.4 to 82.8 years and median age in years ($N = 2$) ranged from 46 to 67 years. For the two studies that employed the MIDUS data set, only the mean age in years (i.e., 46.4 years) and median age in years (i.e., 46 years) during the baseline data collection period (i.e., 1995–1996) was reported, but the third wave of data collection was completed from 2013 to 2014, so reasoned that these participants met our age threshold of 55 years by the third wave of data collection.

3.2.7. Measures of ACEs

Researchers measured ACEs in all studies ($N = 27$), but the types of ACEs measured varied across studies. As shown in Table 2, the two most frequently measured ACEs were physical abuse and parental death or loss. Other commonly measured ACEs included in at least a third of the eligible studies were parental mental illness, parental substance misuse, emotional abuse, childhood poverty, parental divorce or separation, domestic violence, and sexual abuse. Further adding to the variability in ACEs measured, these ACEs were measured with an array of instruments, including previously developed self-report questionnaires (e.g., Adverse Childhood Experiences–International Questionnaire [ACE-IQ; e.g., Yuan et al., 2022], Childhood Trauma Questionnaire [CTQ; e.g., Nilaweera et al., 2022]), self-report questionnaires developed for that study (e.g., Klopack et al., 2022; Lau et al., 2018), or open-ended questions asked during interviews or focus groups (e.g., Korten et al., 2014; Mosley-Johnson et al., 2019).

3.2.8. Measures of resilience

Measures of resilience and related constructs (e.g., coping strategies, social support) also varied across studies, but only seven of the 27 included studies employed a measure of resilience. Most the studies used previously developed resilience measures, such as the Brief Resilience Scale (BRS; e.g., Thoma et al., 2022), Connor Davidson Resilience Scale (CD-RISC; e.g., McLafferty et al., 2021), and Wagnild Resilience Scale (RS-14; e.g., Wagnild & Young, 1993). As a closely related resilience construct, Sheffler et al. (2019) measured coping strategies using the COPE Inventory. Another study by Ritchie et al. (2011) assessed resilience by administering a checklist of protective factors, including maternal and paternal affection, availability of an adult friend, impression of having had a happy childhood, impression of having a normal education, parents perceived as doing their best, feeling happy at school, and having been raised by both parents. Finally, a couple of the studies examined resilience using open-ended interview questions (e.g., Rohner et al., 2022; Spencer-Hwang et al., 2018).

3.2.9. Health outcomes

Table 3 presents reported health outcomes in order of most to least commonly reported. The most reported outcomes were cognitive impairment ($N = 11$), depressive symptoms ($N = 10$), and social well-being ($N = 10$) followed by self-rated health ($N = 5$), multimorbidity ($N = 4$), socioeconomic status ($N = 4$), anxiety symptoms ($N = 3$), and life satisfaction ($N = 3$).

Table 3
Summary of health outcomes measured in included studies.

Health outcomes	References
Cognitive impairment ($N = 11$)	Hu (2021); Ding and He (2021); Korten et al. (2014); Lin et al. (2022); Nilaweera et al. (2022); O'Shea et al. (2021); Ritchie et al. (2011); Tjoelker et al. (2022); van Assche et al. (2020); Xiang et al. (2022); Yuan et al. (2022)
Depressive symptoms ($N = 10$)	Hu (2021); Klopack et al. (2022); Kok et al. (2017); Korten et al. (2014); Li and Xiang (2022); McLafferty et al. (2021); Nishio et al. (2022); Sheffler et al. (2019); van Assche et al. (2020); Zheng et al. (2022)
Social well-being ($N = 10$)	Ding and He (2021); Klopack et al. (2022); Kok et al. (2017); Lin et al. (2022); Mosley-Johnson et al. (2019); Nishio et al. (2022); O'Shea et al. (2021); Rohner et al. (2022); Sosnowski et al. (2019); Thoma et al. (2022)
Self-rated health ($N = 5$)	Hu (2021); Ding and He (2021); Kok et al. (2017); Lau et al. (2018); Nishio et al. (2022)
Multimorbidity ($N = 4$)	Atkinson et al. (2021); Hu (2021); Sheffler et al. (2019); Zheng et al. (2022)
Socioecomic status ($N = 4$)	Ding & He, 2021; Kok et al., 2017; Klopack et al., 2022; O'Shea et al., 2021
Anxiety symptoms ($N = 3$)	McLafferty et al. (2021); Sheffler et al. (2019); van Assche et al. (2020)
Life satisfaction ($N = 3$)	Hu (2021); Kok et al. (2017); Mosley-Johnson et al. (2019)
Apolipoprotein (ApoE; $N = 2$)	Korten et al. (2014); Ritchie et al. (2011)
Attachment style ($N = 2$)	Thoma et al. (2022); van Assche et al. (2020)
Coping strategies ($N = 2$)	Sheffler et al. (2019); Thoma et al. (2022)
Epigenetic aging ($N = 2$)	Klopack et al. (2022); Sosnowski et al. (2019)
Brain volume ($N = 1$)	Koyama et al. (2022)
Circadian cortisol secretion ($N = 1$)	Maier et al. (2022)
C-reactive protein levels ($N = 1$)	Li and Xiang (2022)
Mental health disorders ($N = 1$)	Thoma et al. (2022)
Posttraumatic stress symptoms ($N = 1$)	McLafferty et al. (2021)
Psychological well-being ($N = 1$)	Mosley-Johnson et al. (2019)
White blood cell counts ($N = 1$)	Li and Xiang (2022)

Table 4
Summary of study findings.

Reference	Study findings
Atkinson et al. (2021)	*Age* • Among 65- to 74-year-olds and 75- to 84-year-olds, the number of ACEs had a direct effect on multimorbidity. • Among 65- to 74-year-olds, but not 75- to 84-year-olds, allostatic load partially mediated the relationship between the number of ACEs and multimorbidity. • Among 65- to 74-year-olds, but not 75- to 84-year-olds, social engagement partially mediated the relationship between the number of ACEs and multimorbidity. *Gender* • The direct effect of the number of ACEs on multimorbidity and indirect effects of the number of ACEs on multimorbidity via allostatic load and social engagement were stronger among women than men.
Hu (2021)	• Specific ACEs (i.e., severe disability of a parent, bedridden parent, parent often feeling anxious, parent often feeling depressed, parent suffering from mental illness, parental death, lack of affection, parental neglect, physical abuse by a parent, being poorer than other families, poor health in childhood, experiencing bullying victimization in childhood) were significantly associated with healthy aging. • The number of ACEs was significantly associated with healthy aging. *Age* • The association between the number of ACEs and healthy aging was weaker with increasing age. *Gender* • The association between the number of ACEs and healthy aging was stronger among women than men.
Ding and He (2021)	• Childhood socioeconomic advantage, parental involved trauma, and other traumas had a direct effect on mental intactness. • Childhood socioeconomic advantage, parental involved trauma, and maladaptive parental traumas had a direct effect on episodic memory. • Lower educational attainment, lower financial status, and worse self-rated health partially mediated the relationship between childhood socioeconomic disadvantage and both mental intactness and episodic memory. • Lower educational attainment, lower probability of being married, and worse self-rated health partially mediated the relationship between parental involved trauma and both mental intactness and episodic memory. • Lower financial status and worse self-rated health fully mediated the relationship between maladaptive parental trauma and mental intactness. • Lower educational attainment, lower financial status, and worse self-rated health partially mediated the relationship between maladaptive parental trauma and episodic memory. • Lower probability of being married and worse self-rated health partially mediated the relationship between other traumas and mental intactness. • Lower probability of being married and worse self-rated health fully mediated the relationship between other traums and episodic memory.
Klopack et al. (2022)	• Exposure to two or more ACEs had a direct effect on depressive symptoms compared to having 0 ACEs. • Epigenetic aging as measured by GrimAge and DunedinPoAm38, but not Pheno Age, partially mediated the relationship between ACEs and depressive symptoms. *Socioeconomic position and lifestyle factors* • The mediating effect of epigenetic aging as measured by GrimAge became non-significant when socioeconomic position and lifestyle factors were included as moderators. • For those having 1, 2, or 3 ACEs, the mediating effect of epigenetic aging as measured by DunedinPoAm38 remained became non-significant when socioeconomic position and lifestyle factors were included as moderators.
Kok et al. (2017)	• Parental problems and parental death had a direct effect on successful aging. • Parental problems partially mediated the relationship between parental socioeconomic position and successful aging. • Adulthood socioeconomic position fully mediated the relationship between parental socioeconomic position and successful aging. • Adulthood socioeconomic position and adulthood divorce fully mediated the relationship between parental socioeconomic position and successful aging. *Gender* • Parental death in childhood partially mediated the relationship between parental socioeconomic position and successful aging for men but not women. • Adulthood socioeconomic position and adulthood unemployment fully mediated the relationship between parental socioeconomic position and successful aging for women but not men. • Adulthood socioeconomic position and adulthood occupational disability fully mediated the relationship between parental socioeconomic position and successful aging for men but not women.
Korten et al. (2014)	*Depressive symptoms* • ACEs had a direct effect on declines in processing speed over the course of 10 years if depressive symptoms were present. *ApoE phenotypes*

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Table 4 (*continued*)

Reference	Study findings
	• ApoE phenotypes did not moderate the relationship between ACEs and cognition.s
Koyama et al. (2022)	• Exposure to two or more ACEs was significantly associated with increased volume of the anterior cingulate cortex and decreased volume of the hippocampus and amygdala.
Lau et al. (2018)	• Resilience is positively associated with self-rated health. • Childhood economic and social adversity was not significantly associated with self-rated health.
Li and Xiang (2022)	• The number of ACEs was positively associated with depressive symptoms, high-sensitivity C-reactive protein levels, and white blood cell counts. • Physical abuse, household substance abuse, household mental illness, unsafe neighbourhood, bullying, and parental disability were significantly associated with depressive symptoms. • High-sensitivity C-reactive protein levels partially mediated the relationship between ACEs and depressive symptoms. • White blood cell counts did not mediate the relationship between aces and depressive symptoms.
Lin et al. (2022)	• Compared to no exposure to deprivation-related adversities, exposure to two or more deprivation-related adversities were more likely to have lower global cognition, episodic memory, and executive function scores at baseline. • At follow up, declines in global cognition, episodic memory, and executive function scores were greater with increased exposure to ACEs. • At baseline and follow up, exposure to threat-related ACEs was not associated with global cognition, episodic memory, and executive function scores. *Social isolation* • The relationship between deprivation-related adversities and declines in global cognition and executive function (but not episodic memory) was stronger for the socially isolated group compared to the non-socially isolated group.
Maier et al. (2022)	• Individual experience of violence is negatively associated with decreased total cortisol output throughout the day. cortisol secretion. • Neglect is negatively associated with cortisol decline throughout the day.
McLafferty et al. (2021)	• The group with exposure to elevated levels of physical and psychological abuse had significantly greater likelihood of having anxiety or depression, and resilience fully mediated the relationship of adversity and anxiety. • The group with exposure to elevated levels of the widest range of adversities had significantly greater likelihood to have a range of mental health problems, but resilience partially mediated the relationship of adversity with anxiety and post-traumatic stress symptoms and fully mediated the relationship of adversity with depressive symptoms. • The group with exposure to elevated levels of parental separation, mental illness, substance abuse, and domestic violence did not have greater likelihood of having any mental health problem.
Mosley-Johnson et al. (2019)	• Exposure to at least one ACE was associated with lower life satisfaction, psychological well-being (except for autonomy and personal growth), and social well-being. • Abuse was associated with lower life satisfaction, psychological well-being (except for autonomy and personal growth), and social well-being (except social contribution). • Household dysfunction was associated with lower life satisfaction, psychological well-being (except for autonomy), and social well-being (except for meaningfulness of society and social actualization). • Financial strain was associated with significantly lower meaningfulness of society as part of social well-being.
Nilaweera et al. (2022)	• Exposure to three to four ACEs was associated with worse verbal fluency and psychomotor speed at baseline. • Exposure to five or more ACEs was associated with worse psychomotor speed at baseline. • Parents hospitalized for a long duration was associated with better verbal fluency. • Abuse or maltreatment was associated with worse psychomotor speed. • Poverty and financial difficulties were associated with worse psychomotor speed and executive function. • War events or natural disaster was associated with better executive function. • Exposure to ACEs was not associated with global cognition, visual memory, or incident dementia. *Gender* • Exposure to three or more ACEs was associated with worse psychomotor speed at baseline for women but not men.
Nishio et al. (2022)	• Exposure to one or more ACEs was associated with reduced odds of late-life sociability. • Exposure to parent(s) who suffered a mental illness was most clearly associated with reduced odds of later-life sociability. • Exposure to one or more ACEs was associated with increased odds of having worse depressive symptoms and self-reported health in later life. • Social participation at least once a week weakened the relationship between ACEs and later life depressive symptoms and self-reported health.
O'Shea et al. (2021)	• Having lived in a residential care institution or foster care was associated with worse memory at baseline but not at follow up *Socioeconomic status* • The association between having lived in a residential care institution or foster care and worse memory at baseline was weakened when childhood socioeconomic status was included as a moderator.
Ritchie et al. (2011)	• Excessive sharing of parental problems was associated with increased risk of worse verbal fluency at baseline and follow up. • Excessive sharing of parental problems was associated with increased risk of worse visual memory at follow up. • Death of a parent or humiliation, harassment, or mental cruelty was associated with increased risk of worse verbal fluency at baseline. • Mother suffered from mental problems was associated with decreased risk of worse verbal memory and executive function at baseline. • Impression of having had a happy childhood was associated with decreased risk of worse visual memory and executive function at follow up. *Moderators*

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Table 4 (*continued*)

Reference	Study findings
	• Stronger association between impression of having had a happy childhood and better executive function for older adults with ApoE phenotype compared to those without ApoE phenotype
Rohner et al. (2022)	• Most intrafamialial and institutional abuse survivors eengaged in prosocial behaviour in latere life, and engagement in prosocial behaviour may be supported by increased empathy, a carer self-perception, and meaning making.
Sheffler et al. (2019)	• Exposure to ACEs was significantly associated with more health conditions, increased psychiatric symptoms, and presence of psychiatric disorders at follow up. • Avoidant emotion-focused coping partially mediated the relationship between ACEs and health conditions, psychiatric symptoms, and psychiatric disroders.
Sosnowski et al. (2019)	• Exposure to childhood sexual abuse and telomere length was not significant. • Increases in family social support was associated with increases in telomere length for women who experienced less severe forms of childhood sexual abuse.
Spencer-Hwang et al. (2018)	• Resiliency factors with potential anti-inflammatory properties were identified as having the potential to decrease the risk of chronic disease
Thoma et al. (2022)	• Older adult survivors of child welfare-related maltreatment were more likely to have a lifetime history of mental health disorders if they had experienced physical abuse; scored higher on empathy-related strategies of fantasy and personal distress; or scored lower on resilience or self-esteem. • Older adults who did not experience child welfare-related maltreatment were less likely to have a lifetime history of mental health disorders if they had experienced emotional abuse; scored higher on use of instrumental support as a coping strategy, attachment anxiety, or empathy-related strategy of personal distress, and scored lower on use of humour as a coping strategy and resilience.
Tjoelker et al. (2022)	• Physical abuse was associated with better memory and worse interference control. • Emotional neglect was associated with worse interference control.
van Assche et al. (2020)	• Childhood trauma, and not life events in adulthood, are related to late life anxiety and depression. • Emotional neglect in childhood is related to current attachment anxiety in old age.
Xiang et al. (2022)	• Repeated school year and physical abuse by either parent was associated with increased risk of incident cognitive impairment. • Parental substance problems were associated with decreased risk of incident cognitive impairment. • The relationship between repeated school year and incident cognitive impairment was stronger for women (compared to men) and whites (compared to non-whites). • The relationship between parental substance problems and incident cognitive impairment was weaker for non-whites (compared to whites).
Yuan et al. (2022)	• The child maltreatment class (i.e., emotional neglect, emotional abuse, physical neglect, physical abuse) was associated with an increased risk of cognitive impairment compared to the low ACEs class. • The household dysfunction class (i.e., household member treated violently, household member chronically depressed and/or mentally ill) was not associated with an increased risk of cognitive impairment compared to the low ACEs class.
Zheng et al. (2022)	• Exposure to ACEs is associated with multimorbidity and depressive symptoms at baseline and a faster increase in multimorbidity and depressive symptoms from baseline to follow up. • Multimorbidity partially mediated the relationship between ACEs and depressive symptoms at baseline and follow up. • Depressive symptoms partially mediated the relationship between ACEs and multimorbidity at baseline and follow up.

3.3. Summary of findings

We present a summary of findings for each eligible study in Table 4.

3.3.1. Physical health outcomes

Eight studies examined direct effects of ACEs on brain imaging, genetic, and psychoneuroimmunological indicators of health. With regards to brain imaging, Koyama et al. (2022) reported that participants with exposure to two or more ACEs had an increased volume of the anterior cingulate cortex and decreased volume of the hippocampus and the amygdala compared to participants with exposure to no ACEs. With regards to psychoneuroimmunological indicators of health, exposure to ACEs was associated with decreased total cortisol output and cortisol decline throughout the day (Maier et al., 2022). Another commonly reported outcome associated with ACEs was multimorbidity. Exposure to ACEs had a direct effect on multimorbidity among older adults (Atkinson et al., 2021; Sheffler et al., 2019; Zheng et al., 2022). Moreover, researchers have identified mediators of the relationship between ACEs and multimorbidity, including allostatic load (Atkinson et al., 2021), avoidant emotion-focused coping (Sheffler et al., 2019), depressive symptoms (Zheng et al., 2022), and social engagement (Atkinson et al., 2021). Self-rated health has also been associated with ACE exposure. Nishio et al. (2022) reported that exposure to one or more ACEs was associated with increased odds of having worse self-reported health in later life.

3.3.2. Cognitive health outcomes

Cognitive impairment was the most reported outcome in the included studies. In the included studies, researchers usually identified a direct effect of ACEs on cognitive impairment (Ding & He, 2021; Lin et al., 2022; Nilaweera et al., 2022; O'Shea et al., 2021; Ritchie et al., 2011; Tjoelker et al., 2022; Xiang et al., 2022). Factors influencing the relationship between ACEs and cognitive impairment included depressive symptoms (Korten et al., 2014), education (Ding & He, 2021), marital status (Ding & He, 2021), socioeconomic status (Ding & He, 2021; O'Shea et al., 2021), self-rated health (Ding & He, 2021), and social isolation (Lin et al., 2022). For example, Korten et al. (2014) reported that ACEs had a direct effect on cognitive impairment only if depressive symptoms were present, while Lin et al. (2022) reported that ACEs had a direct effect on cognitive impairment only for the socially isolated group. Additionally, worse self-rated health mediated the relationship between ACEs and cognitive impairment in later life (Ding & He, 2021). Furthermore,

apolipoprotein E (ApoE), a multifunctional protein whose presence increases the risk of Alzheimer's disease, did not moderate the relationship between ACEs and cognitive impairment (Korten et al., 2014), but the relationship between having the impression of a happy childhood and cognitive impairment was found to be stronger for older adults with the ApoE phenotype compared to those without the ApoE phenotype (Ritchie et al., 2011).

3.3.3. Mental health outcomes

Most of the studies examining mental health outcomes associated with ACE exposure focused on late-life depressive symptoms (Hu, 2021; Klopack et al., 2022; Kok et al., 2017; Korten et al., 2014; Li & Xiang, 2022; McLafferty et al., 2021; Nishio et al., 2022; Sheffler et al., 2019; van Assche et al., 2020; Zheng et al., 2022). Most studies found a direct effect of ACEs on later life depressive symptoms (Klopack et al., 2022; Li & Xiang, 2022; McLafferty et al., 2021; Nishio et al., 2022; Sheffler et al., 2019; van Assche et al., 2020; Zheng et al., 2022). Li and Xiang (2022) identified specific ACEs that were associated with later life depressive symptoms: physical abuse, parental substance misuse, parental mental illness, unsafe neighbourhood, childhood bullying, and parental disability. Epigenetic aging mediated the relationship between ACEs and other health outcomes such as depressive symptoms (Klopack et al., 2022). Li and Xiang (2022) reported an association between ACE exposure and both high-sensitivity C-reactive protein levels and white blood cell counts. High-sensitivity C-reactive protein levels, but not by white blood cell counts, mediated the relationship between ACEs and depressive symptoms (Li & Xiang, 2022). Depressive symptoms also moderated the relationship between ACEs and other outcomes (e.g., cognitive impairment [Korten et al., 2014], multimorbidity [Zheng et al., 2022]). Other studies focused on anxiety symptoms (McLafferty et al., 2021; Sheffler et al., 2019; van Assche et al., 2020) or posttraumatic stress symptoms (McLafferty et al., 2021). Thoma et al. (2022) reported that older adult survivors of child welfare-related maltreatment were more likely to have a lifetime history of psychiatric disorders if they had experienced physical abuse but not emotional abuse. Beyond psychiatric symptoms and diagnoses, researchers examined the effect of ACEs on life satisfaction and psychological well-being. Mosley-Johnson et al. (2019), for example, identified an association between exposure to at least one ACE and lower life satisfaction. More specifically, abuse and household dysfunction, but not financial strain, was associated with lower life satisfaction. Exposure to at least one ACE was associated with aspects of psychological well-being (Mosley-Johnson et al., 2019).

3.3.4. Social health outcomes

Exposure to ACEs directly impacts social well-being in later adulthood (Mosley-Johnson et al., 2019; Nishio et al., 2022; Rohner et al., 2022). More specifically, Nishio et al. (2022) identified exposure to parental mental illness as the greatest risk factor for reduced late-life sociability. Social well-being indicators (e.g., social engagement, social isolation, social participation) may also mediate or moderate the relationship between ACEs and other outcomes (e.g., cognitive impairment [Lin et al., 2022], depressive symptoms [Nishio et al., 2022], multimorbidity [Atkinson et al., 2021], self-rated health [Nishio et al., 2022], telomere length [Sosnowski et al., 2019]). As an example, Lin et al. (2022) reported that the relationship between ACEs and cognitive impairment was stronger for the socially isolated group compared to the non-socially isolated group. Atkinson et al., 2021 reported that, while ACEs were associated with multimorbidity in older adulthood, social engagement mediated this relationship. Adulthood socioeconomic status was another social health outcome examined in the included studies (Ding & He, 2021; Kok et al., 2017; Klopack et al., 2022). Adulthood socioeconomic status partially mediated the relationship between ACE exposure and later life cognitive impairment (Ding & He, 2021) and depressive symptoms (Klopack et al., 2022). Kok et al. (2017) also found that adulthood socioeconomic status fully mediated the relationship between parental socioeconomic position and successful aging.

3.3.5. Resilience and coping

While researchers identified associations between exposure to ACEs and adverse physical, mental, cognitive, and social health outcomes, more work is needed to understand the influence of resilience and resilience-related constructs (e.g., coping strategies) on health outcomes in old age. Sosnowski et al. (2019) found that, while individuals exposed to sexual abuse during childhood had increased epigenetic aging, family-based social support moderated this relationship. Similarly, while Nishio et al. (2022) found that exposure to ACEs was associated with poorer self-rated health in old age, social participation at least once a week (conceptualized as a resilience domain) weakened the relationship between ACEs and later life self-reported health and depressive symptoms. Lau et al. (2018) found no significant association between exposure to ACEs and self-reported health but did report that resilience had a positive association with self-reported health. Thoma et al. (2022) studied the influence of abuse and psychiatric disorders and found that individuals exposed to physical abuse were more likely to develop psychiatric disorders, but it was older adults who scored lower on resilience or used more instrumental support and less humour as coping strategies who were more likely to develop psychiatric disorders. Sheffler et al. (2019) also found that coping strategies influenced the relationship between ACEs and psychiatric symptoms and diagnosis. Specifically, Sheffler et al. (2019) noted that avoidant emotion-focused coping partially mediated this relationship. McLafferty et al. (2021) noted that resilience fully mediated the relationship between exposure to elevated levels of the widest range of ACEs and late life depression. McLafferty et al. (2021) also found that exposure to elevated levels of physical and emotional abuse had a direct effect on later life anxiety symptoms and noted that resilience fully mediated this relationship. Elevated levels of the widest range of adversities were also associated with later life anxiety and posttraumatic stress symptoms with resilience partially mediating this relationship (McLafferty et al., 2021). While exposure to ACEs can influence health outcomes in later life, resilience and resilience-related constructs (e.g., coping strategies) have the potential to offset the harm.

4. Discussion

The present scoping review of existing literature on ACEs and resilience on physical, cognitive, mental, and social health outcomes offers insight into potential implications and interventions for ACEs across the lifespan. Overall, exposure to ACEs was found to primarily have a direct effect on multimorbidity (Atkinson et al., 2021; Sheffler et al., 2019; Zheng et al., 2022), self-reported health (Nishio et al., 2022), cognitive impairment (Ding & He, 2021; Lin et al., 2022; Nilaweera et al., 2022; O'Shea et al., 2021; Ritchie et al., 2011; Tjoelker et al., 2022; Xiang et al., 2022), depressive symptoms (Hu, 2021; Klopack et al., 2022; Kok et al., 2017; Korten et al., 2014; Li & Xiang, 2022; McLafferty et al., 2021; Nishio et al., 2022; Sheffler et al., 2019; van Assche et al., 2020; Zheng et al., 2022, and social well-being (Mosley-Johnson et al., 2019; Nishio et al., 2022; Rohner et al., 2022), but these effects sometimes differed according to the specific ACEs experienced (e.g., van Assche et al., 2020) or were influenced by moderators (e.g., depressive symptoms; Korten et al., 2014) or mediators (e.g., social participation; Nishio et al., 2022). In fact, many researchers examined mediating and moderating factors within the included studies, suggesting that the relationship between ACEs and later life outcomes is complex with much left to uncover. Resilience and resilience-related concepts such as coping strategies played a role in the effects of ACEs on later mental health outcomes (McLafferty et al., 2021; Sheffler et al., 2019; Thoma et al., 2022), but we still do not fully understand the role of resilience in aging-related health outcomes.

5. Limitations and future directions

We also note important limitations of this scoping review. Although we conducted an extensive literature search, we did not review studies published after the second search conducted in February 2023, which may be relevant to the current review. Additionally, while we did not limit included studies to the English language, we only used English search terms, which may have led to the exclusion of other potentially relevant studies published in other languages. We also limited our search in that we did not include terms regarding coping strategies such as “protective factors” and “coping strategies” in the search. We could have also weighted studies depending on sample size, methods, and data analysis.

Future studies can expand on the current work, which offers preliminary insights into ACEs, resilience, and health outcomes for older adults. First, in the context of this scoping review, studies included a myriad of childhood events as ACEs. Although we identified commonly included ACEs (e.g., domestic violence, physical abuse), we also identified uncommon ACEs (e.g., friendless childhood, repeated school year), suggesting that we need a clearer delineation of our definition of ACEs. We need more insights regarding patient-reported outcomes of relevance to the lives of those who have experienced at least one ACE. It is possible that, in examining these pre-determined health outcomes, we are missing other health outcomes of importance. More broadly, the relationship between ACEs and health outcomes appears to mediated and/or moderated by several factors, so further studies should focus on elucidating the mechanisms, both positive and negative, that lead from ACEs to later life health outcomes. This work would allow for further development of individual- or population-level interventions.

6. Conclusion

With increasing longevity, there will inevitably be increasing physical adversity for older adults, such as the increased risk of physical disease, dementia, and disability (Brown, 2015). As we continue to push the boundaries of the human lifespan, the likelihood of individuals experiencing greater levels of disease-related adversity increases proportionally. Exposure to childhood adversity places older adults at a further increased risk of experiencing adversity in late life. ACEs place older adults at risk of experiencing depressive symptoms, cognitive impairment, anxiety, and multimorbidity in older adulthood (Atkinson et al., 2021; Korten et al., 2014; Koyama et al., 2022; Sheffler et al., 2019; Zheng et al., 2022). As the population continues to grow older and experience such adversities, we will need to find solutions at a population level to address the needs of older adults and promote well-being. While there is a moderate amount of research examining the impact of ACEs on health outcomes in older adulthood, research examining the relationships between ACES and resilience on health outcomes in this population is sparse. Existing literature indicates that individuals demonstrating resilience may be able to do so, at least in part, because of acquired educational and socioeconomic resources. However, as resilience is a multifaceted construct with relevance to different domains (e.g., environmental, physical, psychological), developing a deeper understanding of the pathways to resilience is a valuable public health objective.

In contrast to other models of “healthy” aging in which avoidance of decline is the primary objective, models of resilience in aging include facing adversities, making the concept of resilience a much more accessible and valuable public health tool. Public policy initiatives to promote resilience at a population level (e.g., funding for social support), with emphasis on social determinants of health (e.g., income level, disability, language, literacy), can support the health and well-being of the burgeoning population of older adults. As highlighted in the life course model of multimorbidity (Wister et al., 2016), engaging with a range of individual, social, and environmental resources may enable older adults to face the challenges of aging and foster greater well-being in their own lives. Asset approaches to resilience emphasize the contributions of resources beyond the individual (e.g., social, environmental), which have strong potential for policy intervention. For example, the WHO has developed ‘Global Age-friendly Cities: A Guide’ (WHO, 2007), documenting the ways in which cities can optimize opportunities for older adults and, in turn, increase their individual, social and environmental resources. Adopting policies outlined by the WHO has the potential to have significant implications for well-being. Through greater social capital and better environmental fit and mastery through policy, we hope that policy makers and decision makers can implement large-scale population-level improvements in resilience to reap the benefits of greater well-being.

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CRediT authorship contribution statement

Kelsey M. Haczkewicz: Writing – review & editing, Writing – original draft, Formal analysis, Data curation, Conceptualization. **Sheza Shahid:** Writing – original draft, Formal analysis, Data curation. **Heather A. Finnegan:** Writing – original draft, Supervision. **Caroline Moninn:** Data curation. **Courtney D. Cameron:** Writing – original draft. **Natasha L. Gallant:** Writing – original draft, Supervision, Project administration, Conceptualization.

Data availability

The data are publicly available.

Appendix 1. Medline (Ovid) search strategy

Date originally searched: July 8, 2021
Date search was updated: February 4, 2023
Number of results: 1919

1	exp Geriatrics/ or Aged/ or Health Services for the Aged/ or Senior Centers/ or (elders or elderly or geriatric* or old age or (seniors not "high school") or older adult* or centenarian* or nonagenarian* or octogenarian* or septuagenarian* or sexagenarian* or "oldest old").mp.
2	Adverse Childhood Experiences/
3	(adverse childhood experience* or adverse childhood event* or childhood adverse experience* or childhood adverse event*).tw,kw.
4	exp "Adult Survivors of Child Adverse Events"/
5	(early-life stress* or early life stress*).tw,kw.
6	((infant or infanc* or child* or p?ediatric or juvenile or adolescen*) adj2 (abuse* or neglect* or household dysfunction*)).tw,kw.
7	((infant or infanc* or child* or paediatric or juvenile or adolescen*) adj1 adversit*).tw,kw.
8	((infant or infanc* or child* or paediatric or juvenile or adolescen*) adj1 resilien*).tw,kw.
9	((infant or infanc* or child* or p?ediatric or juvenile or adolescen*) adj2 (bully* or bullies*)).tw,kf.
10	((parent* or house hold* or household* or maternal* or paternal* or father* or mother*) adj2 (alcoholic* or alcoholism)).tw,kf.
11	((parent* or household or house hold or maternal or paternal or mother* or father*) adj2 (incarcerat* or mental illness* or mental health or depress* or suicid* or institutional* or separation or separated or divorce or violence or violent*)).tw,kf.
12	((parent* or house hold* or household* or maternal* or paternal* or father* or mother*) adj2 (substance abus* or substance dependen* or substance misuse*)).tw,kf.
13	((parent* or house hold* or household* or maternal* or paternal* or father* or mother*) adj2 (alcohol* or drug*) adj2 (addict* or abus* or dependen* or misus* or problem* or disorder*)).tw,kf.
14	(infant or infanc* or child* or p?ediatric or juvenile* or adolescen*).tw,kw.
15	or/2–9
16	or/10–13
17	14 and 16
18	15 or 17
19	1 and 18
20	limit 19 to (english or french)
21	limit 20 to yr = "1998–Current"
22	limit 21 to (comment or editorial or letter)
23	21 not 22

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