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Resilience resources for mental health among people living with HIV: a mixed-method systematic review

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ABSTRACT

People living with HIV (PLWH) experience a disproportionate burden of mental health problems compared to people living without HIV. This systematic review aims to depict the spectrum of resilience resources that may promote the mental health of PLWH at the individual, interpersonal, organisational, community and policy levels. A systematic literature search was conducted in PsycINFO, Scopus, Medline and advanced Google Scholar. The quality of included studies was assessed using the Mixed Methods Appraisal Tool (MMAT). Of the 591 studies identified, fourteen were included representing a total of 5,142 PLWH from China, Ghana, Nepal, Spain, Tanzania and the USA. Resilience resources were identified at the individual level (self-efficacy, self-esteem, acceptance, hope, optimism, religiosity/spirituality, belief in fate, mindfulness, strength and self-responsibility); interpersonal level (social support and parental monitoring); and community level (attending HIV clinic support groups and access to healthcare). All quantitative studies were cross-sectional, limiting inferences about causation or directionality. Future research should focus on resilience resources at the organisational and policy levels and incorporate longitudinal designs.

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KEYWORDS
Resilience; mental health; socioecological model; HIV/AIDS; systematic review

Introduction

People living with HIV (PLWH) experience a disproportionate burden of mental health difficulties compared to people living without HIV (Nanni et al., 2015). PLWH also experience HIV-related stigma which exacerbates mental health problems (Levi-Minzi & Surratt, 2014) and can compromise health behaviours such as adherence to life-saving antiretroviral therapy (ART) (Remien et al., 2019; Uthman et al., 2014). An emerging body of evidence suggests that resilience is associated with positive health outcomes among PLWH, including adherence to ART, viral suppression (Dale et al., 2014) and improved physical and mental health (McGowan et al., 2018). Resilience can be generally defined as the capacity to maintain mental health by managing the negative psychological impact of stress and adversities (Pollock et al., 2020). According to Windle, a systemic definition of resilience "is the process of effectively negotiating, adapting to, or managing significant sources of stress or trauma. Assets and resources within the individual, their life and environment facilitate this capacity or adaptation and 'bouncing back' in the face of adversity" (Windle, 2011).

Conceptualising mental health and resilience resources

This systematic review uses the World Health Organization definition of "mental health", which focuses on positive aspects of emotional, psychological and social well-being rather than the mere absence of symptoms. Resilience resources were named as factors associated with lower levels of psychological symptoms (Patel & Goodman, 2007) and those identified in prior work (Betancourt et al., 2013). For example, if strong familial relationships are associated with reduced probability or severity of psychological symptoms (e.g., anxiety, depression, post-traumatic stress disorder (PTSD)), we refer to it as a resilience resource. Furthermore, this paper utilises a socio-ecological model, which recognises that adversity and resilience occur at multiple, interacting levels to shape the mental health of PLWH (Ungar & Theron, 2020).

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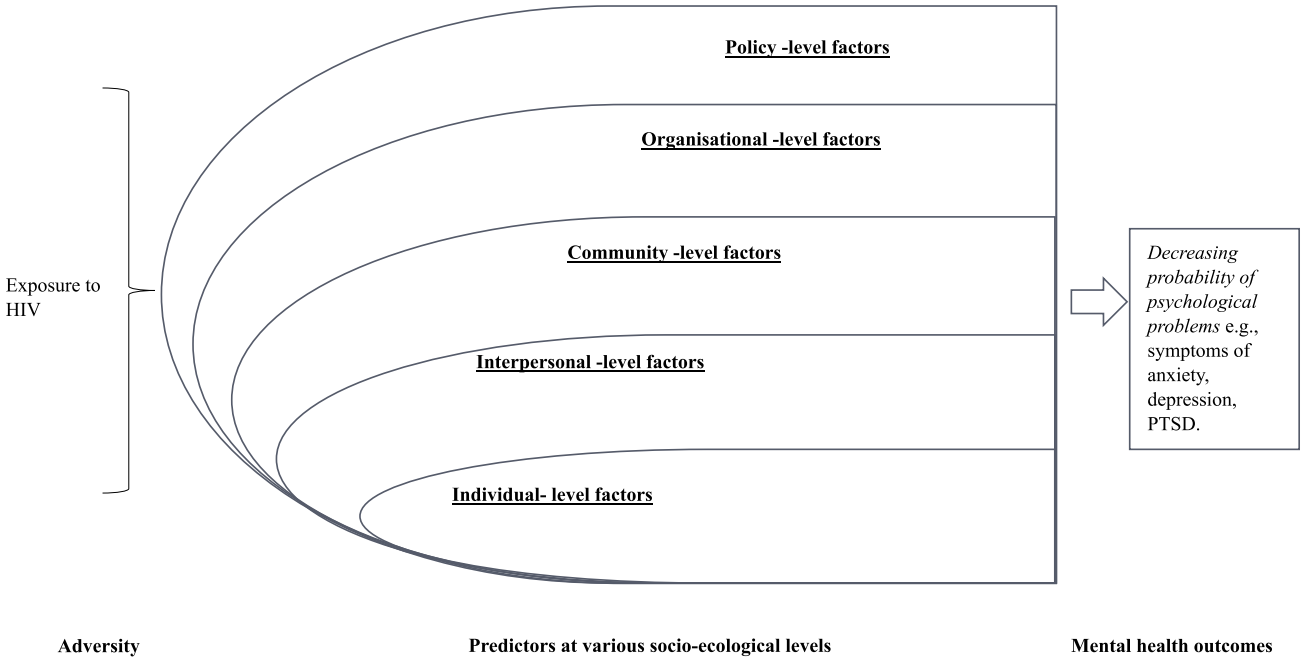

Figure 1. Socio – ecological model of resilience.

For example, resources at the individual level, such as self-esteem, are likely to be shaped by a person's mental health, community, social relationships and policies at the structural level (Ungar & Theron, 2020). Figure 1 summarises the theoretical framework underlying this review.

Investigations on resilience resources at different socioecological levels among PLWH are limited. Research on resilience resources that promote mental health among PLWH has tended to focus on resources at the individual (i.e., self-care) and interpersonal (i.e., social support) levels (Li et al., 2009). This review aims to address these gaps by synthesising existing qualitative, quantitative and mixed-method research on resilience resources that foster mental health among PLWH at various socioecological levels. It is hoped that findings and gaps identified in this review will help in designing further research and psychological support interventions across multiple socioecological levels for PLWH.

Methods

This paper follows the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) 2020 guidelines (Page et al., 2021).

Search strategy and terms

The protocol for this systematic review was pre-published on PROSPERO in 2021 and is available at: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021264940. A systematic literature search was conducted using Medline, PsycINFO, Scopus and advanced Google Scholar with keywords and their synonyms combined via Boolean operators. Key search terms were identified based on work done on resilience and HIV/AIDS (Betancourt et al., 2013; Pollock et al., 2020). We applied key words to identify studies that contained original data that focused on resilience (Resilien* OR adapt* OR protective factors OR optimism OR self-care OR self-efficacy OR community resources OR community programmes OR neighbourhood resources OR medical care), mental health (psychological health OR mental health OR depression or anxiety OR post-traumatic stress disorder) and PLWH (HIV OR human immunodeficiency virus OR AIDS OR acquired immunodeficiency syndrome). Search terms differed slightly for each database. Included primary studies and excluded systematic reviews were additionally backreferenced. No restrictions on geographical area or publication year were applied.

Screening

Returned articles were imported to Mendeley Desktop version 1.19.8 and duplicates were removed. Following predefined inclusion and exclusion criteria (see Table 1), titles and abstracts were first screened by the lead author (SC) and full texts were double screened (SC, PN).

Data extraction and quality assessment

Data were independently extracted by two reviewers (SC, PN) to capture study characteristics and outcomes.

Table 1. Inclusion and exclusion criteria.

Inclusion criteria	Exclusion criteria
Study population • Participants living with HIV regardless of age, gender and geographical location.	• Participants affected by, but not living with HIV (examples include children/adolescents orphaned by HIV, caregivers of children/adolescents affected by HIV or healthcare workers of PLWH).
Exposure: • Resilience resources were named as factors associated with lower levels of psychological symptoms and those identified in prior work (Betancourt et al., 2013). For example, if strong familial relationships are associated with reduced probability or severity of psychological symptoms (e.g., anxiety, depression, post-traumatic stress disorder (PTSD)), we refer to it as a resilience resource.	• Factors associated with reduced mental health problems in population groups other than PLWH (for example, people affected by cancer, diabetes, war, conflicts, etc.).
Outcomes • Any term referring to "mental health" as defined by WHO (such as psychological symptoms of anxiety, depression or post-traumatic stress disorder (PTSD), psychological distress and emotional- related quality of life).	• Physical health. • Substance misuse not associated with mental health.
Study design • Qualitative, quantitative or mixed methods study design, including cross-sectional studies, longitudinal or observational studies.	• Intervention studies (intervention studies were excluded because our review aimed to summarise knowledge on resilience resources in "normal circumstance" for example non- treatment settings)

Critical appraisal was also independently conducted by two authors (SC, PN) using the MMAT (Hong et al., 2018). Any disagreements were decided through consensus or involvement of other authors.

Results

The initial search process identified a total of 591 potentially relevant articles. Fifteen duplicates were removed. Titles and abstracts of the remaining studies were screened and a total of 47 articles were retained for full-text review applying the eligibility criteria. Finally, 14 studies were included in the review (see Figure 2).

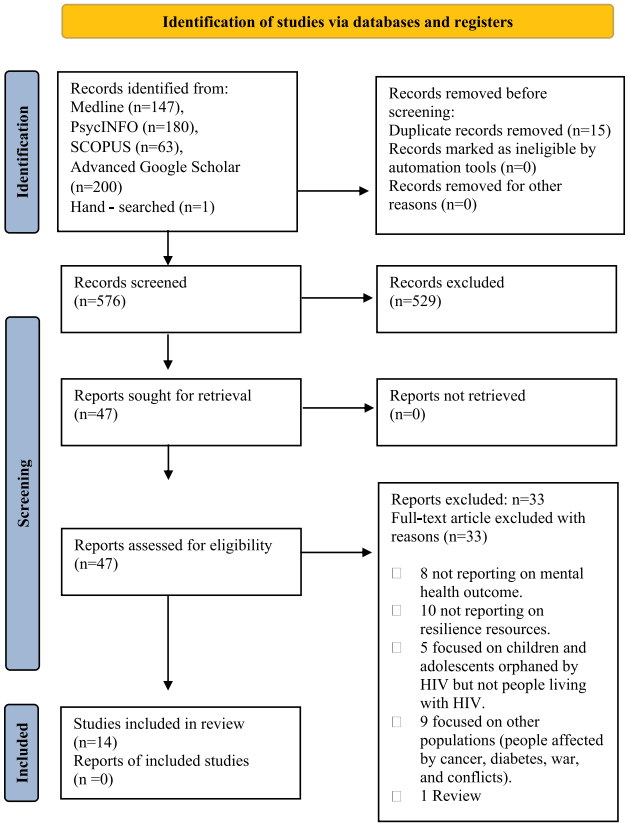

Figure 2. PRISMA flow diagram showing identification and screening process of included studies.

Study characteristics

Table 2 summarises the study characteristics, findings and effect sizes (where reported) of included studies. Twelve studies were quantitative, all of which were cross-sectional, one study used mixed-methods and one was a qualitative study. Represented in these studies were 5,142 PLWH from China (Huang et al., 2018; Liu et al., 2013; Wang et al., 2019), Ghana (Asante, 2012), Nepal (Amiya et al., 2014), South Africa (Boyes et al., 2019; Casale et al., 2019; Woollett et al., 2016), Spain, Tanzania (Steglitz et al., 2012) and the USA (Dalmida et al., 2009, 2013; Gonzalez et al., 2016; Reich et al., 2010).

Seven studies examined resilience resources at the individual level (Boyes et al., 2019; Dalmida et al., 2009, 2013; Gonzalez et al., 2016; Liu et al., 2013; Steglitz et al., 2012; Wang et al., 2019). Nine studies examined relationship between interpersonal level resilience factors and mental health (Amiya et al., 2014; Asante, 2012; Boyes et al., 2019; Casale et al., 2019; Dalmida et al., 2013; Gordillo et al., 2009; Huang et al., 2018; Liu et al., 2013; Reich et al., 2010). Three studies examined resilience resources at the community level (Boyes et al., 2019; Casale et al., 2019; Woollett et al., 2016) whilst one study identified resilience resources in a group of perinatally infected adolescents living with HIV at the individual, interpersonal and community level (Woollett et al., 2016).

A range of mental health outcomes were explored. Ten studies examined depressive symptoms (Amiya et al., 2014; Asante, 2012; Boyes et al., 2019; Casale et al., 2019; Dalmida et al., 2009, 2013; Gordillo et al.,

Table 2. Summary of included studies.

First author, (year), country	Study design	Resilience resources examined (self- reported)	Outcomes (self-reported)	Study setting	Participants (size, group, age (year), Gender (% female))	Statistical method	Covariates	Findings
Amiya (2014), Nepal	Quantitative (Cross-sectional)	Perceived family support	Depression and suicidal ideation	Community-based HIV positive residents in Nepal.	$n = 322$; adults (18–60); 42%	Multiple logistic regression	Gender, age, marital status, having any children, education level, employment status, time since first testing HIV-positive, months on ART, body mass index, any illicit drug use, bothersome HIV symptom counts, Internalised AIDS stigma score and disclosure of HIV status to any family members.	High perceived family support was inversely associated with depression (adjusted odds ratio [AOR] = 0.19; 95% confidence intervals [CI] = 0.07–0.55) and suicidal ideation (AOR = 0.25; 95% CI = 0.07–0.91).
Boyes (2019), South Africa	Quantitative (Cross-sectional)	Accessing clinic support group, social support, self- efficacy, positive parenting and better health	Depression, anxiety and PTSD (post-traumatic stress disorder)	Community sampling of 53 clinics and tracing to over 180 communities.	$n = 1060$; adolescents (10–19); 55%	Multiple linear regression	Age, gender, poverty and location.	Accessing a clinic support group was associated with reduced depressive ($\beta = -0.09$, $p < 0.01$) and anxiety ($\beta = -0.08$, $p < 0.01$) symptoms. Social support was associated with lower depressive symptoms ($\beta = -0.13$, $p < 0.001$). Self- efficacy was associated with lower depressive ($\beta = -0.07$, $p < 0.05$) and anxiety scores ($\beta = -0.07$, $p < 0.01$). Positive parenting was associated with lower depressive ($\beta = -0.11$, $p < 0.001$), anxiety ($\beta = -0.09$, $p < 0.01$) and PTSD ($\beta = -0.21$, $p < 0.001$) scores. Better health was associated with lower depressive ($\beta = -0.06$, $p < 0.05$), anxiety ($\beta = -0.10$, $p < 0.001$) and PSTD ($\beta = -0.13$, $p < 0.001$) scores.
Casale (2019), South Africa	Quantitative (Cross-sectional)	Perceived social support and support group attendance	Depression and suicidal thoughts and behaviour	Community sampling of 53 clinics and tracing to over 180 communities	$n = 1053$; adolescents (10–19); 55%	Partial correlations	Age, gender, location, mode of infection, whether caregiver is biological parent and socio-economic status.	Perceived social support was associated with reduced suicidal thoughts ($r = -0.119$, $p < 0.001$) and reduced depression ($r = -0.259$, $p < 0.001$). Support group attendance was not associated with depression ($r = -0.036$, $p > 0.05$) and suicidal thoughts ($r = -0.020$, $p > 0.05$).
						Multivariate regression	Age, gender, location, mode of infection, whether caregiver is biological parent and socio-economic status. Regression model also includes interaction terms between stigma and perceived social support, and stigma and support group attendance.	High perceived social support was directly associated with less depression ($\beta = -0.182$, $p < 0.001$) but not suicidal thoughts and behaviour ($\beta = 0.025$, $p > 0.05$). Support group attendance was not associated with both depression ($\beta = -0.113$, $p > 0.05$) and suicidal thoughts and behaviour ($\beta = -0.017$, $p > 0.05$).

(*Continued*)

Table 2. Continued.

First author, (year), country	Study design	Resilience resources examined (self- reported)	Outcomes (self-reported)	Study setting	Participants (size, group, age (year), Gender (% female))	Statistical method	Covariates	Findings
Dalmida (2013), USA	Quantitative (Cross-sectional)	Religious coping (RCOPE) and social support satisfaction.	Depression	Out-patient infectious disease clinic and AIDS-service organisations in the South-Eastern United States.	$n = 292$; adults (18+); 44%	Logistic regression	Education level, birth sex, income level and sexual orientation.	Having greater social support satisfaction (OR = 0.65, 95% CI = 0.49–0.86) and having positive religious coping (OR = 0.93,95% CI = 0.86–1.00) were associated with reduced odds of being depressed.
Gonzalez (2016), USA	Quantitative (Cross-sectional)	Mindfulness- acting with awareness.	PTSD symptoms	Local AIDS service organisations (ASOs) and hospital-based medical clinics in Vermont and New Hampshire, New York.	$n = 137$; adults (18+); 14.6%	Hierarchical regression analysis	Age, sex, education and number of traumatic events	Among the mindfulness facets measured, acting with awareness was negatively related to the severity of PTSD symptoms ($\beta = -0.25$, $p < 0.01$).
Gordillo (2009), 12 European countries	Quantitative (Cross-sectional)	Emotional support from partner and family/friends	Depression, anxiety and stress	16 European HIV treatment centres from 13 European countries.	$n = 409$; adults (18+); 25%	Hierarchical multiple regression	Age, education, employment, financial status, country of origin, Partner HIV-status, whether having children, experience of HIV- discrimination, route of HIV transmission, sexual orientation, medication status and self-rated health.	Emotional support from family/friends was associated with lower levels of depression ($\beta = -0.11$, $p < 0.05$) and anxiety ($\beta = -0.11$, $p < 0.05$) in both men and women living with HIV. With regards to gender modifying the association, emotional support from family and friends predicted low levels of stress ($\beta = -0.18$, $p < 0.01$), depression ($\beta = -0.18$, $p < 0.01$) and anxiety ($\beta = -0.18$, $p < 0.01$) in men living with HIV. However, emotional support from family and friends was marginally associated with higher stress ($\beta = -0.19$, $p = 0.07$) but was not associated with depression ($\beta = -0.6$, $p =$ not significant (ns)) or anxiety ($\beta = -0.06$, $p =$ not significant (ns)) in women living with HIV.
Huang (2018), China	Quantitative (Cross-sectional)	Marital and family relationships mediated by individual resilience resources	Mental health and general well-being	Five villages from among 22 villages where the HIV prevalence is greater than 10% in Henan province, China.	$n = 160$; adults (18+); 65%	Correlation analysis and structural equation modelling	-	A better marital relationship ($r = -0.24$, $p < 0.01$), better family relationship ($r = -0.27$, $p < 0.01$) and individual resilience ($r = -0.31$, $p < 0.01$) resources were associated with fewer mentally unhealthy days. **Structural equation modelling (SEM) results:** Marital ($\beta = 0.35$, $p < 0.01$) and family relationship ($\beta = 0.27$, $p < 0.01$) were associated with higher individual resilience resources. Individual resilience resources were associated with fewer mentally unhealthy days ($\beta = -0.23$, $p < 0.05$). **Mediation**; *Indirect effect through individual resilience resources*; Between marital relationship and mentally unhealthy days ($Z = -0.28$, $p < 0.05$) and family relationship ($Z = -1.20$, $p < NS$)
Liu (2013), China	Quantitative (Cross-sectional)	Functional social support (FSS), psychological capital (PC), hope, optimism and self-efficacy	Depression and anxiety symptoms	PLWH registered in Liaoning Provincial CDC by November 30, 2010, in China	$n = 320$; adults (18–60); 6.9%	Correlation analysis	–	Functional social support (FSS) ($r = -0.31$, $p < 0.01$) psychological capital (PC) ($r = -0.59$, $p < 0.01$), hope ($r = -0.57$, $p < 0.01$), optimism ($r = -0.51$, $p < 0.01$) and self-efficacy ($r = -0.49$, $p < 0.01$) was negatively correlated with depression. Functional social support (FSS) ($r = -0.26$, $p < 0.01$) psychological capital (PC) ($r = -0.44$, $p < 0.01$), hope ($r = -0.39$, $p < 0.01$), optimism ($r = -0.39$, $p < 0.01$) and self-efficacy ($r = -0.39$, $p < 0.01$) was negatively correlated with anxiety symptoms.

(*Continued*)

Table 2. Continued.

First author, (year), country	Study design	Resilience resources examined (self- reported)	Outcomes (self-reported)	Study setting	Participants (size, group, age (year), Gender (% female))	Statistical method	Covariates	Findings
						Regression analysis	Age, gender, education, monthly income, combined antiretroviral therapy treatment (cART) and months since HIV- seropositive.	FSS was negatively associated with depressive symptoms ($\beta = -0.29$, $p < 0.001$) and anxiety symptoms ($\beta = -0.23$, $p < 0.001$). PC was negatively associated with depressive and ($\beta = -0.56$, $p < -0.01$) anxiety symptoms ($\beta = 0.41$, $p < 0.01$).
Asante (2012), Ghana	Quantitative (Cross-sectional)	Social support	Depression, anxiety and stress	Out-patients living with HIV/AIDS who were receiving medical treatment at the Fevers' Unit of the Korle-Bu Teaching Hospital, Accra.	$n = 107$; adults (18+); 63.6%	Pearson correlation	–	Social support was negatively correlated with depression ($r = -0.44$, $p < 0.01$), anxiety ($r = -0.52$, $p < 0.01$) and stress ($r = -0.17 < 0.01$). Being female was correlated with depression ($r = 0.83$, $p < 0.01$), anxiety ($r = 0.83$, $p < 0.01$), and stress ($r = 0.22$, $p = 0.02$),
						Regression analysis	Age and gender	Higher levels of social support were associated with lower levels of depression (standardised beta) ($\beta = -0.18$, $p < 0.0001$), stress ($\beta = -0.37$, $p < 0.0001$) but not anxiety ($\beta = -0.07$, $p = 0.024$) for both men and women. Older participants experienced higher levels of stress than their younger counterparts ($\beta = 0.17$, $p < 0.001$). For women, lower level of social support was associated with higher rates of anxiety ($\beta = 0.96$, $p < 0.05$), depression ($\beta = 0.88$, $p < 0.05$) and stress ($\beta = 0.24$, $p < 0.0001$).
Reich (2010), USA	Mixed methods (in-depth interviews and questionnaires)	Social support	Mental health and well-being	16 community-based service agencies and clinics and six hospital-based clinics serving HIV people.	$n = 626$; adults (18–70); Not reported	Multiple regression analysis	Age, gender, HIV disclosure, drinker	Having one or more "important persons" (e.g., siblings, children or other relatives) as part of social network for PLWH was associated with positive mental health ($\beta = 0.14$, $p < 0.01$).
Dalmida (2009), USA	Quantitative (Cross-sectional)	Spiritual well-being (SWB)/ religious practices	Depression	The study used secondary analysis of data from two similar projects that recruited HIV-positive women from four infectious disease clinics in the South-East.	$n = 129$; adult – African-American women; 100%	Pearson's correlation	–	Spiritual well- being/religious practices were negatively associated with depressive symptoms ($r = -0.55$, $p = 0.001$) among African- American HIV- positive women.
						Multiple linear regression	Age, education, employment status, marital status, HIV medication adherence, and HIV viral load (log)	Spiritual well- being (SWB)/religious practices: ($F = 9.68$, $p = 0.0001$); SWB accounted for amount of variance in depressive symptoms.
Steglitz (2012), Tanzania	Quantitative (Cross-sectional)	Religiosity and spirituality.	Depression, anxiety and stress	Rural, low-income HIV-positive adults from community HIV care and treatment centres.	$n = 135$; adults (18–65); 87.1%	Regression analysis	Age, sex, duration of HIV-positive status	More religiosity was associated with less avoidant coping ($\beta = -0.35$, $p < 0.05$) and more social support ($\beta = 0.27$, $p < 0.05$), while spirituality was related to more active coping ($\beta = 0.49$, $p < 0.001$) and more social support ($\beta = 0.48$, $p < 0.001$) Avoidant coping was related to more depression ($\beta = 0.68$, $p < 0.01$), anxiety ($\beta = 0.57$, $p < 0.01$) and stress ($\beta = 0.54$, $p < 0.001$)

(*Continued*)

Table 2. Continued.

First author, (year), country	Study design	Resilience resources examined (self- reported)	Outcomes (self-reported)	Study setting	Participants (size, group, age (year), Gender (% female))	Statistical method	Covariates	Findings
								Social support was related to less depression ($\beta = -0.27$, $p < 0.01$), anxiety ($\beta = -0.30$, $p < 0.001$) and stress ($\beta = -0.34$, $p < 0.01$). ***Mediation***; *Indirect effects through social support* Between spirituality and depression ($Z = -2.51$, $P < 0.01$), anxiety ($Z = -2.54$, $P < 0.01$) and stress ($Z = -2.67$, $P < 0.01$). *Indirect effects through avoidant coping* Between religiosity and depression ($Z = -1.97$, $p < 0.05$), anxiety ($Z = -1.98$, $p < 0.05$) and stress ($Z = -1.96$, $p < 0.05$). *Indirect effects through social support* Between religiosity and depression ($Z = -1.71$, $P < 0.08$), anxiety ($Z = -1.72$, $P < 0.08$) and stress ($Z = -1.76$, $P < 0.07$).
Wang (2019), China	Quantitative (Cross-sectional)	General self-efficacy	Depression and anxiety	The study used data from the Multi-component HIV Intervention Packages for Chinese MSM (China MP3 Project),	$n = 367$; Adults - Men who have sex with men (MSM) (18+); 0%	Logistic regression	Age, ethnicity, marital status, education, occupation, health care, place of birth, drug and alcohol use	*Simple logistic regression analysis:* general self- efficacy was negatively associated with depression (before adjusting confounders) (odds ratio (OR): 0.90, 95% CI: 0.86–0.93). There was a negative association between genera self-efficacy and depression (adjusted odds ratio (AOR): 0.88, 95% confidence interval (CI):0.85–0.92). *Simple logistic regression analysis*; general -self efficacy was negatively associated with anxiety (OR: 0.90, 95% CI: 0.87–0.93). After adjusting for confounders, general self-efficacy was negatively associated with anxiety (AOR: 0.89, 95%CI: 0.86–0.93).
Woollet (2016), South Africa	Qualitative (In-depth interviews)	Belief in fate, recognition of strength, acceptance of one's life and health, taking responsibility, self-esteem, accessing adults and parental role models support and accessing healthcare services.	Mental health and well-being	5 HIV clinics serving adolescents in Johannesburg.3 hospital-based clinics,1 community health centre and 1 primary health care clinic	$n = 25$; adolescents (13–19); 60%	Not applicable	Not applicable	Not applicable

2009; Liu et al., 2013; Steglitz et al., 2012; Wang et al., 2019), six studies reported anxiety symptoms (Asante, 2012; Boyes et al., 2019; Gordillo et al., 2009; Liu et al., 2013; Steglitz et al., 2012; Wang et al., 2019), two studies reported on suicidal thoughts (Amiya et al., 2014; Casale et al., 2019), another two studies mentioned PTSD (Boyes et al., 2019; Gonzalez et al., 2016), three studies examined stress (Asante, 2012; Gordillo et al., 2009; Steglitz et al., 2012) and another three studies mentioned general mental health and well-being (Huang et al., 2018; Reich et al., 2010; Woollett et al., 2016).

In terms of the study setting, five studies recruited PLWH via hospitals (Asante, 2012; Dalmida et al., 2009, 2013; Gonzalez et al., 2016; Wang et al., 2019), three studies used community-based HIV care and treatment centres (Amiya et al., 2014; Gordillo et al., 2009; Steglitz et al., 2012), two studies recruited from both hospital-based clinics and community-based HIV care centres (Reich et al., 2010; Woollett et al., 2016) while two studies identified participants from the hospital and clinic records followed by community tracing to identify participants not actively engaged in the health system (Boyes et al., 2019; Casale et al., 2019). One study recruited from villages where HIV prevalence was greater than 10% in Henan province, China (Huang et al., 2018) and another study recruited PLWH registered in Liaoning provincial CDC in China (Liu et al., 2013).

Most studies included only adults. Three studies (Boyes et al., 2019; Casale et al., 2019; Woollett et al., 2016) included adolescents (10–19 age range). No studies included children below the age of 10. In terms of key-high risk populations, only one study included men who have sex with men (MSM) (Wang et al., 2019).

Resilience resources at socio-ecological levels

A summary of resilience resources described in the included studies is provided in Table 2. An overview of these resilience resources categorised according to the different socioecological levels is shown in Figure 3.

Individual-level resilience resources

Three studies found an association between self-efficacy and mental health. One study reported that self-efficacy was weakly associated with lower levels of depression ($\beta = -0.07$, $p < 0.05$) and anxiety ($\beta = -0.07$, $p < 0.01$) among adolescents living with HIV (ALHIV) in South Africa (Boyes et al., 2019). In another study of 320 PLWH in full-time employment in China, self-efficacy was moderately associated with lower levels of depressive ($r = -0.49$, $p < 0.01$) and anxiety ($r = -0.39$, $p < 0.01$) symptoms (Liu et al., 2013). In a study among newly HIV diagnosed Chinese MSM in China, a participant with a higher general self-efficacy experiences a reduction of 12% odds of being depressed (adjusted odds ratio (AOR): 0.88, 95% confidence interval (CI): 0.85–0.92) and a reduction of 11% odds of being

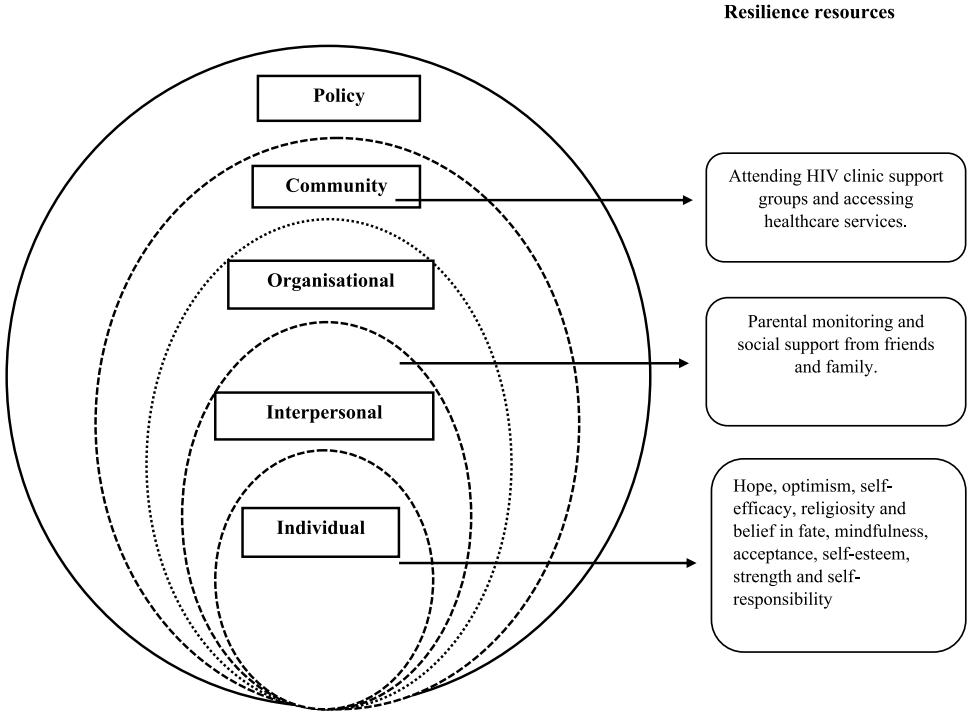

Figure 3. Resilience resources for mental health among PLWH.

anxious (AOR: 0.89, 95% CI: 0.86–0.93) compared to participants with lower general self-efficacy (Wang et al., 2019).

Religiosity and belief in fate was associated with better mental health outcomes among PLWH in three and one studies, respectively. A Tanzania study found a significant indirect relationship between religiosity and spirituality with mental health disorders through avoidant coping and social support, respectively (Steglitz et al., 2012). More religiosity was moderately associated with less avoidant coping ($\beta = -0.35$, $p < 0.05$) and weakly associated with more social support ($\beta = 0.27$, $p < 0.05$) while being more spiritual was moderately related with more active coping ($\beta = 0.49$, $p < 0.001$) and more social support ($\beta = 0.48$, $p < 0.001$) (Steglitz et al., 2012). Avoidant coping was moderate to strongly related to more depression ($\beta = 0.68$, $p < 0.01$), anxiety ($\beta = 0.57$, $p < 0.01$) and stress ($\beta = 0.54$, $p < 0.001$) while more social support was weakly associated with lower levels of depression ($\beta = -0.27$, $p < 0.01$) and moderately associated with lower levels of both anxiety ($\beta = -0.30$, $p < 0.001$) and stress ($\beta = -0.34$, $p < 0.01$)

Table 3. Critical appraisal of studies included in the systematic review using the mixed methods appraisal Tool (MMAT).

	Qualitative study				
	1.1. Is the qualitative approach appropriate to answer the research question?	1.2. Are the qualitative data collection methods adequate to address the research question?	1.3. Are the findings adequately derived from the data?	1.4. Is the interpretation of results sufficiently substantiated by data?	1.5. Is there coherence between qualitative data sources, collection, analysis & interpretation?
Woollett et al. (2016)	y	y	u	u	u
	Quantitative studies				
	4.1. Is the sampling strategy relevant to address the research question?	4.2. Is the sample representative of the target population?	4.3. Are the measurements appropriate?	4.4. Is the risk of nonresponse bias low?	4.5. Is the statistical analysis appropriate to answer the research question?
Boyes et al. (2019)	y	y	y	u	y
Huang et al. (2018)	y	y	y	u	y
Steglitz et al. (2012)	y	y	y	y	y
Gordillo et al. (2009)	y	y	y	y	y
Liu et al. (2013)	y	y	y	y	y
Gonzalez et al. (2016)	u	y	y	y	y
Wang et al. (2019)	y	y	y	y	y
Amiya et al. (2014)	y	y	y	y	y
Asante (2012)	y	y	y	y	y
Dalmida et al. (2009)	y	y	y	y	y
Casale et al. (2019)	y	y	y	y	y
Dalmida et al. (2013)	y	y	y	y	y
	Mixed Methods study				
	5.1. Is there an adequate rationale for using a mixed-methods design to address the research question?	5.2. Are the different components of the study effectively integrated to answer the research question?	5.3. Are the outputs of the integration of qualitative and quantitative components adequately interpreted?	5.4. Are divergences and inconsistencies between quantitative and qualitative results adequately addressed?	5.5. Do the different components of the study adhere to the quality criteria of each tradition of the methods involved?
Reich et al. (2010)	y	n	n	u	u

Note: y: yes; n: no and u: unclear.

symptoms (Steglitz et al., 2012). Mediation analysis showed there were significant indirect effects through social support between spirituality and depression (Z = −2.51, $p < 0.01$), spirituality and anxiety (Z = −2.54, $p < 0.01$) and spirituality and stress (Z = −2.67, $p < 0.01$) (Steglitz et al., 2012). There were also significant indirect effects through avoidant coping between religiosity and depression (Z = −1.97, $p < 0.05$), religiosity and anxiety (Z = −1.98, $p < 0.05$) and religiosity and stress (Z = −1.96, $p < 0.05$) (Steglitz et al., 2012). In addition, there were indirect effects through social support between religiosity and depression (Z = −1.71, $p < 0.08$), religiosity and anxiety (Z = −1.72, $p < 0.08$) and religiosity and stress (Z = −1.76, $p < 0.07$) (Steglitz et al., 2012). This suggests that avoidant coping had an influence between religiosity and mental health outcomes, while social support carried the influence between spirituality and mental health outcomes among PLWH (Steglitz et al., 2012).

Dalmida et al. found that religious practices (prayer/meditation) were moderately correlated with lower levels of depressive symptoms ($r = -0.55$, $p = 0.001$) among African American women living with HIV in the USA (Dalmida et al., 2009). Similarly, a study of 292 PLWH from the USA reported that a participant practicing religious coping experiences a reduction of 7% odds of being depressed (OR = 0.93, 95% CI = 0.86–1.00) compared to participant who do not practice religious coping (Dalmida et al., 2013). In a qualitative study, ALHIV from South Africa reported that belief in fate promoted their mental health (Woollett et al., 2016).

Mindfulness (acting with awareness) was weakly associated with lower levels of PTSD symptoms ($\beta = -0.25$, $p < 0.01$) among traumatised adults living with HIV in the USA (Gonzalez et al., 2016). The study by Liu et al. reported that hope ($r = -0.57$, $p < 0.01$) and optimism ($r = -0.51$, $p < 0.01$) were moderate to strongly correlated with lower levels of depressive symptoms among PLWH employed full-time in China (Liu et al., 2013). In a qualitative South African study, ALHIV reported that internal strength and self-responsibility promoted their mental health (Woollett et al., 2016). In the same study, self-esteem, coping and acceptance were associated with better mental health among ALHIV (Woollett et al., 2016).

Interpersonal-level resilience resources

Of the ten studies examining resilience resources at the interpersonal level, one study (Boyes et al., 2019) investigated parental monitoring while the rest focused on family and peer relationships.

Boyes et al. (2019) ($n = 1060$ South African ALHIV) reported that positive parental monitoring was associated with fewer symptoms of depression, anxiety and PTSD with small effect sizes ($\beta = -0.11$, $p < 0.001$), ($\beta = -0.09$, $p < 0.01$ and $\beta = -0.21$, $p < 0.001$, respectively). Correlation results reported that supportive marital relationship ($r = -0.24$, $p < 0.01$) and family relationship (r = −0.27, $p < 0.01$) were weakly associated with fewer mentally unhealthy days among PLWH in China (Huang et al., 2018). When considering individual resilience resources in the model, results from structural equation modelling (SEM) found no association between marital relationship ($\beta = -0.10$, p = not significant (ns)) and mentally unhealthy days (Huang et al., 2018). Marital relationship ($\beta = 0.35$, $p < 0.01$) and family relationship ($\beta = 0.27$, $p < 0.01$) were moderately and weakly associated with higher levels of individual resilience resources, respectively (Huang et al., 2018). Meanwhile, individual resilience resources were weakly associated with fewer mental unhealthy days ($\beta = -0.23$, $p < 0.05$) (Huang et al., 2018). Mediation analysis reported indirect effects of individual resilience resources as the mediator between marital relationship and mental unhealthy days (Z = −0.28, $p < 0.05$) while the mediation effect of individual resilience resources between family relationship and mentally unhealthy days was not significant (Z = −1.20, $p <$ ns) (Huang et al., 2018). This suggests that individual resilience resources carried a significant influence in the association between marital relationship and mentally unhealthy days.

Gordillo et al. found that emotional support from partners and family/friends was weakly associated with lower levels of depression ($\beta = -0.11$, $p < 0.05$) and anxiety ($\beta = -0.11$, $p < 0.05$) among PLWH in a study conducted in 12 European countries (Gordillo et al., 2009). In a cross-sectional survey of 322 PLWH in Nepal, participant with higher perceived family support experiences a reduction of 81% odds of being depressed (AOR = 0.19; 95% confidence intervals [CI] = 0.07–0.55) and a reduction of 75% odds of having suicidal thoughts (AOR = 0.25; 95% CI = 0.07–0.91) compared to a participant with lower perceived family support (Amiya et al., 2014). Functional social support was weakly associated with lower levels of depressive symptoms ($\beta = -0.29$, $p < 0.001$) and anxiety ($\beta = -0.23$, $p < 0.001$) among PLWH employed full-time in China (Liu et al., 2013). In addition, social support ($\beta = 0.14$, $p < 0.01$) from "important persons" (e.g., siblings, children or other relatives) was weakly associated with positive mental health among HIV positive adults in the USA (Reich et al., 2010).

In a study conducted in Ghana, correlation analysis revealed that higher levels of social support were moderately associated with lower levels of depression ($r =$

−0.44, $p < 0.01$), anxiety ($r = -0.52$, $p < 0.01$) and weakly associated with stress ($r = -0.17$, $p < 0.01$) among PLWH (Asante, 2012). With age and gender included in regression model, association between anxiety and social support was no longer significant ($\beta = -0.07$, $p = 0.024$) (Asante, 2012) suggesting potential mediation effects through age and gender. However, the paper did not include mediation analysis. Additionally, higher social support was weakly associated with lower levels of depression ($\beta = -0.13$, $p < 0.001$) among ALHIV in South Africa (Boyes et al., 2019). Another paper using the same sample of South African ALHIV reported that higher perceived social support was weakly associated with less depression ($r = -0.259$, $p < 0.001$) (Casale et al., 2019). In a study among PLWH from the USA, participant with greater satisfaction with social support experiences a reduction of 35% odds of being depressed (OR = 0.65, 95% CI = 0.49–0.86) compared with participant with less satisfaction with social support (Dalmida et al., 2013). Social support from parental role models for ALHIV from South Africa promoted better mental health (Woollett et al., 2016).

Community-level resilience resources

Three papers examined resilience resources at the community level for ALHIV. A study of 1060 ALHIV from South Africa found that accessing a clinic support group was weakly associated with lower levels of depression ($\beta = -0.09$, $p < 0.01$) and anxiety ($\beta = -0.08$, $p < 0.01$) symptoms (Boyes et al., 2019). In contrast, using the same sample, Casale et al. reported that participating in an HIV support group was not associated with depression ($\beta = -0.113$, $p > 0.05$) and suicidal thoughts ($\beta = -0.017$, $p > 0.05$) among ALHIV (Casale et al., 2019). The differences in the observed findings are probably attributable to variations in methodological approach, for example, Casale et al., included a greater number of potential explanatory factors in their correlation and regression models, which likely acted to attenuate associations. In addition, Casale et al., also included interaction terms in their regression model to examine whether support group attendance moderated the association between stigma and mental health outcomes. There was evidence of an interaction ($\beta = -0.23$, $p < 0.01$; not shown) which may have reduced the strength of association between support group attendance and depression. A qualitative study on ALHIV in South Africa highlighted the importance of widely available healthcare services which provided access to free ART in promoting mental health among ALHIV (Woollett et al., 2016).

Critical appraisal of the included studies

Mixed-Methods Appraisal Tool (MMAT) results are summarised in Table 3. The overall quality of included studies was moderate, with most quantitative studies fulfilling all five criteria. The single qualitative study included (Woollett et al., 2016) fulfilled two criteria, and the mixed-method study (Reich et al., 2010) fulfilled only one criterion.

Discussion

This systematic review synthesised evidence on resilience resources for mental health among PLWH at the individual, interpersonal and community levels. The cross-sectional nature of included studies limits inferences about causality. Nonetheless, as the first comprehensive review of resilience resources among PLWH, findings can valuably inform much-needed future research, theory and practice.

At the individual level, self-efficacy, optimism, religiosity, spirituality, belief in fate, mindfulness, strength, self-esteem and self-responsibility presented weak to moderate associations with mental health outcomes among PLWH. One study conducted mediation analysis where social support and avoidant coping mediated the relationship between spirituality and religiosity with mental health of PLWH (Steglitz et al., 2012). This suggests that individual level resilience resources and interpersonal level resources work together to promote mental health and well- being (Zhang et al., 2018). Interventions to promote individual level resilience should be addressed to improve the mental health of PLWH.

Interpersonal level resilience resources were associated with mental health outcomes with small effect sizes. Parental monitoring was associated with better mental health outcomes among PLWH in one cross-sectional study. Consistent with our finding, parental intervention had a positive mental health impact in children affected by HIV in Rwanda (Betancourt et al., 2017). Parental monitoring might have facilitated family communication fostering healthy parent–child relationships thus preventing mental health problems (Betancourt et al., 2017). Training parents to employ positive parenting practices such as communication and active listening can contribute to improved mental health in children.

Social support from family/friends also promoted better mental health in nine cross-sectional studies and one mixed-methods. One of study reported that protective effects of social support from marital relationship on mental health was mediated by individual resilience resources (Huang et al., 2018). This suggests that marital relationship benefit mental health

by enhancing individual resilience resources. Therefore, enhancing interpersonal level resilience resources may strengthen individual level resilience resources thus promoting mental health. Social support from family and friends are helpful in reducing mental health problems (Bostean et al., 2019).

At the community level, attending HIV clinic support groups was associated with better mental health outcomes in one cross-sectional study (Boyes et al., 2019), but not in a similar study which concurrently examined an interaction with stigma (Casale et al., 2019). Access to healthcare services promoted better mental health among PLWH in one qualitative study (Woollett et al., 2016). Clinic support group attendance could have enhanced coping skills and provided social support to PLWH thus promoting mental health. This aligns with the previous finding that support group interventions in Uganda improved the mental health of PLWH through promotion of emotional, social support and positive adaptive coping skills (Nakimuli-Mpungu et al., 2020). Incorporating clinic support groups in HIV treatment might promote mental health among PLWH.

This systematic review included both child and adult-focused studies. At the interpersonal level, studies on both adults and children/ALHIV reported that social support from family, friends and healthcare providers played a crucial role in promoting mental health among PLWH. Studies on children and ALHIV reported community level resilience resources underscoring the importance of accessing healthcare services and clinic support groups in fostering mental health. Clinic attendance promoted peer relationship development and access to supportive paediatric staff (Woollett et al., 2016). This data suggests that promoting accessible healthcare and clinic support groups attendance could be an important programme target for children and ALHIV. In addition, making youth friendly clinics and training staff on the care of children and adolescents may promote clinic attendance (Reif et al., 2016). Moreover, studies on children and ALHIV underscored the importance of parental monitoring and parental/adults role models in promoting mental health. Incorporating parental/adult role models programmes in HIV care could promote mental health among ALHIV. On the other hand, studies on HIV positive adults emphasised individual resilience resources noting the significance of religion and spiritual well-being in promoting mental health.

Implications for policy and practice

Together with the broader literature on mental health intervention effectiveness, findings from this review point to several promising avenues for practice. Incorporating religious activities into mental health support programmes may be helpful for some PLWH. There is precedent for this. An intervention study conducted by Ravaei et al. reported that spiritual training (teaching spiritual prayers and monologues, reading quranic and spiritual traditional verses) were effective in improving the mental health of people who inject drugs living with HIV from Iran ($n = 300$) (Ravaei et al., 2012). This is consistent with our findings which suggest that spirituality/religious practices (prayers and meditation) may be promote mental health (Dalmida et al., 2009, 2013; Steglitz et al., 2012). Spirituality/religious practices may be effective in changing an individual's view of their health (Ravaei et al., 2012). In addition, spirituality may promote social support which in turn reduces mental health problems among PLWH (Steglitz et al., 2012) but it is crucial to offer such interventions for PLWH as optional and respect their choice on whether to participate or not.

Integrating social support into healthcare services could contribute to improved mental health among PLWH. Marital support relationship benefit mental health by enhancing individual resilience resource (Huang et al., 2018). Findings by Simoni et al. suggested that peer support intervention was effective in reducing depressive symptoms among PLWH (Simoni et al., 2007). This agrees with our findings which established that social support from family and friends may promote mental health among PLWH.

Support group interventions may improve adaptive coping skill and self-esteem which may facilitate HIV status disclosure thus promoting mental health among PLWH (Mundell et al., 2011). An intervention study conducted by Mundell et al. among newly diagnosed HIV pregnant women in South Africa reported that a psychological support group intervention was effective in fostering mental health (Mundell et al., 2011). This is consistent with the findings of this study which reported that attending a clinic support group promoted better mental health PLWH (Boyes et al., 2019).

Strengths and limitations

To our knowledge, this is the first comprehensive review of evidence on resilience resources among PLWH. It included both adults and children and examined resilience resources through a socioecological lens. However, this review had some limitations. First, studies not published in English were excluded. Second, the findings of this review are only as robust as the primary research in the field, which is mostly cross-sectional. This limits our ability to make causal inferences regarding the direction

of the relationship between resilience resources and mental health. Third, the included studies were heterogeneous in their methodological approach which makes it challenging to synthesise the results, for example, some studies adjusted for no, or few potential confounders which may over-estimate associations; however, most effect estimates tended to be in a consistent direction with findings supported by prior work. Finally, apart from two studies (Huang et al., 2018; Steglitz et al., 2012), the included studies did not account for potential interaction effects between resilience factors which could suggest a potential over or under-estimation of associations; for example, it is possible individual level-factors (e.g., high self-efficacy) and interpersonal factors (e.g., strong family relationships) could interact to produce stronger protective effects on mental health outcomes than either factor alone (Ungar & Theron, 2020).

Conclusion

This review identified resilience resources that foster mental health among PLWH at the individual, interpersonal and community levels. The evidence base is in nascent stages, with notable gaps.

First, there are no longitudinal studies. Establishing the causal relationship will help in understanding underlying mechanisms and in predicting outcomes of certain actions or interventions. Further studies should incorporate longitudinal designs. Second, there are few studies with key populations, which limits applicability for tailored interventions. Future studies should focus on other key populations. Last, no studies examined resilience resources for PLWH at the organisational and policy levels. Resilience is shaped by factors across different levels (individual, interpersonal, organisational, community and policy levels) (Ungar & Theron, 2020). Adopting a multisystemic approach to understanding resilience and promoting mental health is key. Future research should focus on resilience resources at the organisational and policy levels.

This review highlighted the important roles of family/relationships, religious activities and individual level resilience resources in supporting mental health of PLWH. These community and individual level resilience resources should continue to be leveraged in psycho-social support programmes.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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