

Effects and Processes Linking Social Support to Caregiver Health Among HIV/AIDS-Affected Carer-Child Dyads: A Critical Review of the Empirical Evidence

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Abstract There is evidence to suggest that social support may be an important resource for the mental and physical health of caregivers and children affected by HIV/AIDS, especially in HIV-endemic areas of the developing world. Drawing from theory on social relations and health, in this paper we argue that it is important to assess not only the existence and direction of associations, but also the effects and processes explaining these. We refer to House et al's (in *Annu Rev Sociol* 14:293–318, 1988) theoretical framework on social support structures and processes as a guide to present and discuss findings of a systematic review of literature assessing the relationship between social support and health among caregivers living with HIV or caring for HIV/AIDS-affected children. Findings confirm the importance of social support for health among this population, but also expose the absence of empirical work deriving from the developing world, as well as the need for further investigation on the biopsychosocial processes explaining observed effects.

Keywords Social support · HIV/AIDS · Caregivers of children · Mental health · Physical health

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Introduction

The importance of social support in relation to health has been described simply as "... supportive relationships that directly provide something that people need to stay healthy or adapt to stress." [1, p 302]. Social support has been shown to be a protective factor for both mental and physical health among various adult populations [2–5]. More specifically, it has been shown to be positively associated with better health outcomes of caregivers of children [6, 7], including caregivers of children with health conditions or disabilities [8–10], as well as HIV-positive individuals [11–13]. These effects are also relevant to child wellbeing, as better caregiver health is associated with better parenting and child health [14–16].

In Southern Africa and many other parts of the developing world, HIV/AIDS constitutes a key stressor for individuals and households. This is both as a result of the direct effects of illness on HIV-positive individuals [17, 18] and the broader social consequences of the disease [19]. In particular, the burden of care is increasing with an increase in orphans and other vulnerable children in need of care [20], accentuating mental and physical health risks for carers [2, 21]. Individuals who are both directly affected by the HIV/AIDS epidemic and caregivers of children are therefore facing potentially cumulative stresses and heightened health risks. In contexts where formal institutional support is absent or inadequate [22], informal social support constitutes a particularly important potential resource for coping and health, and may be the key to more effective carer and child health interventions. Achieving a better understanding of the interaction between social support and caregiver health should therefore be a priority, especially for caregivers living with HIV or caring for affected children.

The relationship between social support and health is, however, far from straightforward. Firstly, social support is a multidimensional concept and the literature exposes a

multitude of constructs, definitions and measurement tools, which have not all been shown to have the same importance for health or specific health outcomes [23, 24]. Secondly, social support is hypothesised to positively impact health outcomes through various, potentially co-existing, pathways and processes. It may mitigate the effects of stressors on health or have a direct independent effect. These effects are posited to occur through multiple biopsychosocial processes that include promoting self-esteem, encouraging positive health behaviours, and increasing access to resources that help cope with stress [24–27]. To achieve a good understanding of the relationships between social support and health among AIDS-affected carer-child dyads, it would therefore be important to go beyond documenting the existence and direction of these relationships, to investigate the specific pathways and processes through which social support may be affecting mental and physical health outcomes of this population. However research on social support and health has remained vastly under-explored in Southern Africa and most of the developing world. Moreover, to our knowledge no previous systematic review has been conducted of the international literature quantitatively assessing the relationship between social support and caregiver health outcomes among HIV/AIDS-affected caregiver-child dyads.

In this paper we refer to key theoretical literature on social relations and health and, specifically, to a theoretical framework developed by House et al. [1] to illustrate the structures and processes of social relationships in relation to health. Using this framework as a guide, we present and discuss the findings of a systematic review conducted from April to September 2011, to consolidate the existing literature on the relationship between social support and health among caregivers of children living with HIV or caring for HIV/AIDS-affected children. Methodological characteristics of relevant studies will be presented, as will key findings, gaps and reflections for future research. In particular, based on the theoretical framework presented below [1], we will highlight not only the direction of the relationships found, but also the effects and processes through which social support was found to be associated with specific health outcomes. Taking into account both methodological limitations of relevant papers, as well as the pathways identified in the literature reviewed, we will highlight gaps in existing knowledge and possible areas for future research.

Background

Health Risks for HIV-Affected Caregivers of Children and Protective Role of Social Support

The HIV/AIDS epidemic has significantly contributed to the demand for child care in HIV-endemic areas, and this

phenomenon is likely to increase further as the social consequences of the epidemic continue to unfold. Sub-Saharan Africa is by far the most affected region: almost 90 % of the approximately 17 million children orphaned as a result of AIDS world-wide live in Sub-Saharan Africa [28], and this figure does not include other orphans or non-orphaned children in need of care. The majority of these children have to date been taken in by the extended family and, though arguably a better option for children than institutional care, this places significant strain on ‘informal’ caregivers, most of whom are women [29–31].

The prevalence of physical and mental health disorders in the developing world, and in Southern Africa in particular, is elevated [28, 32–34] and stressors related to both HIV/AIDS and caregiving are likely contributing to this phenomenon. In Southern Africa and beyond, research shows that stress derived from caregiving responsibilities presents significant risks for caregiver mental and physical health, especially in conditions of poverty and other livelihood stressors [2, 21, 22, 35–37]. Caring for a child with a particular health condition or disability may be especially stressful and studies have shown that caring for an ill child (including a child with HIV) is associated with greater parenting stress and worse mental health outcomes [9, 10, 38].

At the same time, HIV-positive individuals have heightened physical and mental health risks, especially as the severity of the disease increases. Various studies, in fact, provide evidence of a positive relationship between HIV-related symptoms and depression [17, 18] and some suggest that greater distress may predict disease progression and symptoms [39]. For HIV-positive individuals who are also caregivers of—potentially multiple—children, these health risks may be greater, as they would face both stressors related to living with HIV/AIDS (including AIDS-related stigma and social isolation [37, 40–43]) and stressors related to caregiving. For example, Patterson et al. [44] find increased parental role strain to be associated with increased depressive symptoms among both HIV-positive fathers and mothers. There is also evidence that providing care for AIDS-orphaned biological or foster children may be particularly stressful and demanding [45], with consequences including poorer use of health facilities, greater concern with and neglect of one’s own health, stress-related somatic complaints and chronic health conditions [31, 45–47]. A representative community sample of adults caring for children in an HIV-endemic South African community found poorer general health and functioning and worse mental health outcomes among carers of orphaned children than among carers of non-orphaned children [48].

The positive relationship between higher social support and better mental health outcomes among caregiver

populations is well established, through research conducted mainly in the developed world. For example social support has been shown to moderate the effects of stresses and strain on depressive symptoms [7] and to buffer caregiving stress and increase life satisfaction among grandparents caring for children [6]. Specifically with regard to caregivers of children with health conditions, social support has been shown to be a protective factor against stress or strain for carers looking after children with disabilities [8], a key coping resource to deal with caregiving burden of chronically ill children [10], and a protective factor for psychiatric symptoms among mothers of chronically ill children [9].

Theory and Evidence on the Relationship Between Social Support and Health

While theory on the relationship between social support and health has its roots in seminal sociological literature on social integration (see for example: [49]), research on these themes rapidly gained momentum in the 1970s and '80s through work conducted mainly by health scientists with a psychology orientation [1]. Among the most important contributions from this period is the work of authors such as Cassel [50], Cobb [51] and Caplan [52], who focused primarily on demonstrating the stress-buffering potential of social support, that is its ability to attenuate the effects of psychosocial stressors on health. The stress-buffering hypothesis suggests that social support is protective of health primarily or only in the presence of stressful circumstances [1, 53]. Stress-buffering is observed when the association between stress and worse mental health is stronger for individuals with low social support than for individuals with high social support.

The stress-buffering hypothesis may also be considered an extension of the general theory of psychological stress and coping developed by Lazarus and colleagues over a number of years [54–57]. According to this stress process framework, the relationship between stressful events encountered and emotional outcomes for an individual is mediated by the processes of cognitive appraisal and coping. Cognitive appraisal is the process through which a person evaluates the importance of the stressor for their wellbeing, and the options for coping [57]. Coping responses are defined as constantly changing cognitive and behavioural efforts (thoughts and acts) employed by individuals to manage stressful events [56, 57]. It is therefore not stress/stressors alone but also the way that an individual appraises and copes with stress that determines the effect of stress on individual health. Social support may be considered an example of an external (relational) coping resource that can be drawn on for help and that can influence the choice of coping strategies (for example by providing

information or advice, or influencing the decision to seek the support of others) [58, 59]. Types of coping include active problem-focused coping strategies (e.g. facing and defining the problem, problem-solving, choosing and acting on a solution, seeking support from others in addressing the problem) or emotion-focused coping strategies (i.e. attempting to ignore the problem e.g. distancing, keeping feelings to one's self, cognitive escape-avoidance, seeking emotional support) [60, 61]. While various empirical studies (including with HIV positive individuals) have shown active coping strategies to be associated with more social support and positive health outcomes, and passive coping to be associated with less social support, higher health risk behaviours and increased psychological distress [60–64], this is not always the case. Coping processes are not good or bad in themselves; rather their effects depend on the specific context in which they occur [56, 61], and there are situations in which distancing or other forms of emotion-focused coping may be associated with better mental health outcomes (for example, in the case of less controllable stressors) [61, 65]. Thus, according to stress process frameworks, social support may buffer the effects of stress on mental health by positively influencing the choice of coping responses associated with better mental health outcomes, whether these responses be problem-focused or emotion-focused. It is therefore hypothesised that the effects of social support on psychological distress are mediated by coping responses [60].

In recent years, however, arguments have emerged for a greater focus on explaining the more frequently observed main (versus buffering) effects of social support on health [3, 54, 66]. Main effects occur when people with more social support have better mental health outcomes than people with less social support, regardless of the presence or level of stress. In this case the effects of social support would not be—or not completely be—mediated by coping.

Attempts to explain main effects hypothesise that these effects are a result of ordinary social interaction rather than stress and coping specifically [54, 67]. Drawing from previous sociological writings [49, 68], authors refer, for example, to social interaction and support providing people with regular positive experiences, stability and a sense of self-worth [5] and social roles resulting in a sense of identity, belonging and self-esteem [67]. More recently, Lakey and Orehek [54] argue for a greater focus on 'relational regulation theory', which hypothesises that main effects of support occur when people regulate their affect, thought and action through regular ordinary conversations and shared activities with specific support providers in both stressful and non-stressful situations, rather than conversations specifically about how to cope with stress [54]; thus supportiveness primarily reflects relational influences. Regarding primarily the identified associations between

social support and physical health outcomes, Uchino [66] proposes an explanation, defined as a ‘life-span perspective,’ which focuses more on the individual than on relationships. It suggests that individuals with positive early family environments develop ‘positive psychosocial profiles,’ including perceived support, certain personality traits and/or individual differences, social skills, self-esteem and feelings of personal control [66, p 237]. These positive profiles are hypothesised to be related to health through various behavioural mechanisms, mainly more proactive coping but also healthy behavioural choices (e.g. improved treatment adherence) [66]. A key difference between this theory and previous explanations based on self-esteem [67], is that self-esteem is hypothesised to be developed as part of a positive profile, simultaneously with perceived support, rather than a mediating factor explaining links between support and health.

Most empirical quantitative studies conducted since the mid-1970s have, in fact, been able to show either a significant main effect or buffering effect of social relationships, or both. However, neither type of effect is found uniformly across studies (these trends are also highlighted by literature reviews conducted in the 1980s, for example: [5, 69]). Outcomes also appear to depend on the social support constructs and measurements tools used. For example, functional aspects of support, such as usefulness and quality of types of support available, have been found to be more important than structural properties of support, such as social network size, especially with regard to stress-buffering [5, 70]. Types of support include emotional support, instrumental support (e.g. lending money or providing other forms of assistance), informational support (e.g. advice) and appraisal support (e.g. constructive feedback) [25]. Also, measures of perceived social support, based on the perception of how available and adequate this support is, appear to be more strongly linked to mental health outcomes than retrospective measures of actual support received, which may be confounded with severity of stress and support needs [1, 71].

Theoretical Framework Illustrating Structure and Processes Linking Social Relations to Health

To understand and discuss the empirical findings reviewed in this paper in relation to the broader theory on social support and health, we refer to a conceptual framework developed by House et al. [1] to illustrate both the positioning of social support within the broader structure of social relationships and the potential biopsychosocial processes or pathways through which social support can affect mental and physical health outcomes. We chose this framework because it recognises the complexity of the relationship between social support and health, and is

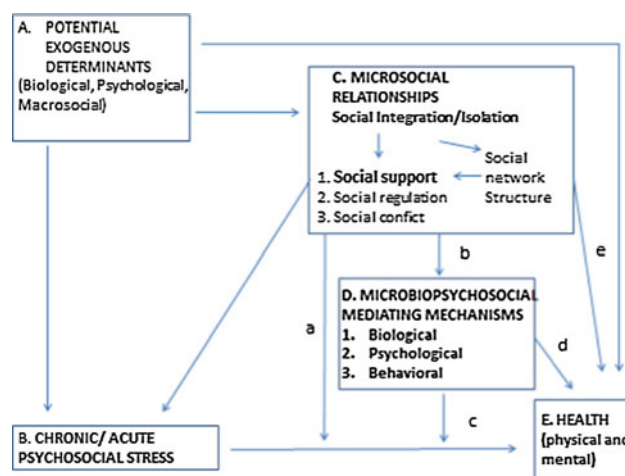


Fig. 1 Framework to illustrate structures and processes of social relationships in relation to health, taken from House, Umberson and Landis, 1988, pp 303. The *b/d* pathway illustrates main effects as mediated by biopsychosocial mechanisms; the *e* pathway represents these main effects in the absence of mediation; the *b/c* pathway illustrates buffering effects as mediated by biopsychosocial mechanisms; the *a* pathway represents buffering effects in the absence of this mediation

comprehensive in its illustration of and distinction between the potential (stress-buffering and main) effects of social support and the processes explaining these. This framework is shown in Fig. 1, taken directly from House et al [1], in which the associations of interest for this review have been highlighted in bold text. The authors argue that, while existing literature has shown the existence of a relationship between the quantity and quality of social relationships and health outcomes, it is much less clear exactly what it is about these relationships that affects health and how these effects occur [1, 24].

The authors define the concept of social support as a key dimension of ‘microsocial relationships’ for health, distinct however from social integration and social network structure. While the latter two variables refer respectively to the existence or quantity of social relationships and the structure characterising these relationships, social support is an element of the relational content, that is the ‘functional nature or quality’ of social relationships (p 302), through which the effects of social integration and social networks can be mediated: ‘Support refers to the positive, potentially health promoting or stress-buffering, aspects of relationships such as instrumental aid, emotional caring or concern, and information.’ (p 302). The other two important forms of relational content included in the model are worth noting, though beyond the focus of this paper; these are: (1) relational demands and conflicts and (2) social regulation or control. The former refers to the negative or conflictive aspects of relationships that may have an adverse effect on health, while the latter is defined as the controlling or

regulating quality of social relationships which may either have a positive or negative effect on health [1].

This model also illustrates the processes or mechanisms linking social support and other dimensions of social relationships to health. These processes may be biological, psychological or behavioural [1]. These are distinct from the issue of whether social support produces main or buffering effects, which instead indicates whether these processes operate at all times or mainly/only when an individual is confronted by stress or health hazards [1]. It is hypothesised that both main and stress-buffering effects can occur through any of these three types of processes. The authors highlight that ultimately the impact of social variables on physical—and to some extent mental—health must occur through biological mechanisms; this is supported by human and animal studies showing, for example, how the presence of and affectionate contact with another similar organism can reduce cardiovascular and other forms of physiological reactivity [72, 73]. Psychological mechanisms, representing the second type of process, may in part be related to biological mechanisms but are also distinct: relationships or attachments may lead people to feel better psychologically, and this could have physiological effects. Social relationships may also change individuals' perceptions of the world and of stressful situations; this can be linked to the much-cited work of Lazarus et al [74] on the role of social relationships in moderating the appraisal of stressors. Finally, social relationships can lead to behavioural change (the third type of process), including health-promoting behaviours (e.g. more sleep, better diet, exercise, better treatment adherence) or behaviours that are protective of health in stressful or threatening situations. A key example of the latter is adaptive coping behaviour [1, 75], coherent with Lazarus and Folkman's stress and coping theory [56]. According to stress-process coping models, social support would be expected to buffer stress through both psychological and behavioural mediating processes related to coping (pathways *b* and *c* in Fig. 1). Main effects mediated by changes in thought and action (coherent with relational regulation theory [54]) would be represented by pathways *b* and *d*. Buffering effects and main effects not mediated by these microbiopsychosocial processes are represented by pathways *a* and *e* respectively.

Methods: Systematic Review Methodology, Characteristics of Relevant Articles and Analysis of Findings

From April to September 2011 a systematic literature review was conducted to identify all published and unpublished international studies that quantitatively assess

the association between one or more measurable dimension of social support and one or more measurable physical or mental health outcome, among HIV-positive adult caregivers of children or adult caregivers of HIV-affected children. Firstly, a keyword search strategy and composite search term were developed according to the PICO (Population, Intervention, Comparison and Outcome) inclusion criteria [76] by defining (a) the population of interest as 'HIV-positive caregivers of children' and/or 'caregivers of HIV/AIDS-affected children'; (b) the intervention or phenomenon of interest as 'social support'; (c) potential comparison groups as HIV-negative caregivers of children, caregivers of children not affected by HIV or AIDS and HIV-positive adults not caregivers of children and; (d) the key outcomes as measured 'mental and physical health outcomes' (see Table 1 for further detail). This search term was, however, not limited to specific health outcomes, in anticipation of the small number of existing studies and wide possible range of outcomes measured, and was not restricted by the presence of terms for 'child'; rather, abstracts were hand searched to determine relevance. Also, the definition of HIV-affected children was kept broad for this review, in anticipation of little available work in this area; it could therefore refer to children directly affected in any way by the epidemic, including HIV-positive children, children orphaned by AIDS and biological children of AIDS-ill parents in foster care. The search was limited to English-language studies, given the absence of resources for translation; however no date or geographical limitations were imposed.

Twenty-two database groups were searched between April and June 2011 (see Table 1 for detailed list). Additional strategies to identify further relevant papers included: (a) searching key HIV/AIDS and public health websites, to identify further published or 'grey' literature; (b) searching online through the Google search-engine, using keywords such as 'HIV', 'AIDS' and 'social support' (c) searching International AIDS Conference and International AIDS Society conference abstracts for the period 2005–2011, to identify potential full papers not yet publicly available; (d) searching the bibliographies of all studies identified as relevant; and e) contacting the first author of each relevant manuscript regarding recent work on these themes not publicly available.

Excel spreadsheets were used to record the details of each source searched (date, search string etc.), the number of abstracts retrieved and the number of duplicates. All abstracts were read and hand-searched by the first author to determine relevance, and full text was retrieved for all potentially relevant abstracts. These full text papers were then read thoroughly to determine inclusion and exclusion. Papers that did not fit with the PICO criteria were excluded, and reasons for exclusion recorded in a separate excel

Table 1 Search strategy and sources of final relevant papers

Search criteria (as per the PICO inclusion criteria; Cochrane Collaboration)	<p>Population: HIV-positive and/or AIDS-ill adult caregivers of children AND/OR caregivers of HIV/AIDS-affected children</p> <p>Intervention: social support</p> <p>Comparison: HIV-negative caregivers of children; caregivers of children not affected by HIV or AIDS; HIV-positive adults not caregivers of children</p> <p>Outcome: measured mental health outcomes; measured physical health outcomes</p>
Composite search strings	<p><i>Construction of composite search strings</i></p> <p>Composite search strings were constructed for each database using the following terms and all variations:</p> <p><i>To describe the population:</i> carer, caring for, caregiver, guardian, parent, custodian, mother, father, caretaker AND hiv, human immunodeficiency virus, human immunodeficiency virus, human immuno-deficiency virus, human immune-deficiency virus, acquired immunodeficiency syndrome, acquired immunodeficiency syndrome, acquired immuno-deficiency syndrome, acquired immune-deficiency syndrome</p> <p><i>To describe the intervention:</i> social support, social network, support system, psychosocial support, psycho-social support</p> <p><i>To describe the outcomes of interest (mental and physical health):</i> no limiters included in the search term for mental or physical health outcomes; these were determined through hand-searching abstracts</p> <p><i>Example of composite search string</i></p> <p>(“social support” OR “social network*” OR “support system*” OR “psychosocial support” OR “psycho-social support”) AND (carer* OR “caring for” OR caregiver* OR “care giver*” OR guardian* OR parent* OR custodian* OR mother* OR father* OR caretaker*) AND (HIV OR HIV-* OR HIV/AIDS* OR AIDS* OR hiv OR hiv-1* OR hiv-2* OR hiv1 OR hiv2 OR “human immunodeficiency virus” OR “human immunodeficiency virus” OR “human immuno-deficiency virus” OR “human immune-deficiency virus” OR (“human immun*” AND “deficiency virus”) OR “acquired immunodeficiency syndrome” OR “acquired immunodeficiency syndrome” OR “acquired immuno-deficiency syndrome” OR “acquired immune-deficiency syndrome” OR (“acquired immun*” AND “deficiency syndrome”))</p> <p><i>Other search restrictions imposed (geographical, dates etc.):</i> none</p>
Databases searched	<p>Ebscohost linked databases (Academic search complete, Africa wide information, ATLA religion, CINAHL, Econ List, ERIC, Health Consumer, Health Source nursing, Master file, Medline, MLA directory, MLA international, PsychArticles, PsycINFO, Religion and philosophy collection); Pubmed; Cochrane Library; JSTOR; Sabinet; SAcad-2001; SA thesis; Proquest; Oxford Journals; AJOL; Sociological Abstracts; CABI direct; Proquest dissertations and theses; African Journal Archive; Anthropological Index; Combined Health Information; Cambridge Online Journals; Directory of Open access; Social Science Citation Index; Social Science Databases, WHOLIS, African Index Medicus</p>
Other sources searched	<p>International AIDS Conferences and International AIDS Society conference abstracts searched for conferences held from 2005 to 2011; available at: http://www.iasociety.org/AbstractSearch.aspx</p> <p>Google search using key words such as ‘social support’, ‘caregivers’ and ‘health’</p> <p>Searched websites of key development, HIV/AIDS and public health organisations: UNAIDS, UNICEF, WHO, International AIDS Society</p> <p>Searched reference lists of all full text articles identified as relevant</p> <p>Contacted first authors of all articles identified as relevant, for further recent publications</p>
Sources of final relevant articles [18]	<p>Database search: 13</p> <p>Reference lists of relevant articles: 3</p> <p>Papers/references sent by authors: 2</p>

spreadsheet. Reasons for exclusion included: wrong population or intervention, absence of health outcomes or social support measures, associations of interest not quantitatively assessed.

Of the over 5,000 database and conference abstracts reviewed, only 44 were identified as potentially relevant and full text articles for these were retrieved. After reading full articles, a final number of 18 papers and 17 studies

were identified as relevant and included in this review (two papers report findings from the same broader study and sample, and will therefore be considered as one study [60, 77]. Sources of final relevant papers included in this review are also indicated in Table 1. The majority of relevant articles [13] were retrieved through database searches, a further three from the reference lists of relevant articles and two from direct contact with authors. The web searches did not yield any further results. Two potentially relevant abstracts were identified from the lists of international AIDS conference abstracts and first authors were contacted; however, full papers were not available.

Each paper in the final sample was read multiple times and analysed with regard to (a) methodological characteristics and (b) findings in relation to associations between social support and mental or physical health outcomes of caregivers. This information was extracted, synthesized and organized using excel spreadsheets.

Table 1 in Electronic Supplementary Material summarises key characteristics of the 17 relevant studies, including sampling and analytical methodologies. Five were documented through doctoral theses and the remaining 12 through academic journal articles. Almost all of the studies included in this review [16] were conducted in the US. Publication years ranged from 1995 to 2010, although most papers were published before 2005. Sample sizes ranged from 25 to 409 and study samples consisted predominantly of African American biological mothers. For the majority of studies [15] participants were HIV- positive and/or AIDS-ill caregivers of children, while two studies worked with HIV-positive and HIV-negative caregivers of HIV-affected children [78, 79]. Gay's [96] study worked with women who were both HIV-positive and mothers of HIV-infected children. All studies collected data through some form of administered survey instrument; in addition three studies examined medical records to obtain specific health indicators [80–82]. All studies employed statistical analysis, with the majority of studies using multivariate regression analysis (9 studies) or structural equation modelling (4 studies) [60, 77, 83–85].

Relationships explored, as well as constructs and measurement tools used, differed across studies, excluding the possibility of statistical meta-analysis (the constructs and measurement tools used for social support and key health outcomes measured are listed in Table 2). Content analysis was conducted and findings organized based on the type of associations and pathways identified between social support and measured health outcomes, as per House et al's conceptual framework presented above (see Fig. 1). Associations tested and findings of relevant studies relating to social support and health are summarized below in Table 2. Significant associations found are also illustrated graphically in Fig. 2, which is a slightly adapted version of

a section of the House et al [1] framework presented in Fig. 1.

Based on this framework, the four key questions used to guide the discussion of findings were: (1) *Do these findings show a significant relationship between social support and health outcomes explored among this population of caregivers?* and, if yes; (2) *What is the direction of these relationships?*; (3) *Is there evidence of main effects or stress-buffering effects of social support on health outcomes in the presence of HIV/AIDS-related stressors?*; and (4) *Do these studies further our knowledge on the processes explaining these effects (i.e. the processes described by House et al)?*

Results

Study Findings

While most studies in this review assessed the association between social support and mental health outcomes [13], one study focused on physical health outcomes [82] and three studies explored both types of health outcomes [78, 80, 83]. Fifteen studies tested for direct main effects, through either regression analysis or structural equation models. Six studies tested main effects as mediated by coping processes [56], through either bivariate tests, regressions or structural equation models, thus testing coping-related appraisal and behaviour as biopsychosocial mediators, as described above [1]. Five studies tested for stress buffering effects, through moderation terms in regression analysis, to explore whether social support changed the relationship between a specific stressor/stressors and the health outcome(s) of interest.

Of the five studies that explored stress-buffering effects of social support on health outcomes, three found evidence of these effects and two did not find significant associations. Of the 15 studies that tested for direct main effects, ten found evidence of these effects and five did not. Of the six studies that tested for main effects through coping, three found evidence of these effects and three did not. The paragraphs below summarise these findings, based on the type of effects and processes explored. Associations found by relevant studies are also illustrated diagrammatically in Fig. 2 below; the arrows in bold represent associations found and the numbers to the left of each arrow indicate the numbers of studies (as numbered in Table 2) that found significant associations represented by the arrow.

Stress Buffering Effects of Social Support on (Mental) Health

Three studies provided evidence of stress buffering of specific (general life or HIV-related) stressors through

Table 2 Summary of key social support and health findings

Study	Reference	Social support dimensions and scales used	Stressors, coping and health outcomes measured	Pathways explored	Findings in relation to associations between social support and health outcomes
1	a) Burns et al. [60] b) Prado et al. [77]	Social support network: Social Support Questionnaire—Short Form SSQ6 [113, 114]	Stress: composite score created from three measures: [1] Hassles Scale [115]; [2] Difficult Life Circumstances Questionnaire [116]; and [3] Life Events Scale shortened version [117] <i>Coping</i> : Brief Cope [118] <i>Psychological distress</i> : Brief Symptom Inventory [119]	Direct main effects on psychological distress Main effects, as mediated by coping strategies	<i>Evidence of main effects mediated through coping but no direct main effects</i> : More stressors positively associated with greater distress both directly and indirectly through more avoidant coping Larger social support network indirectly associated with psychological distress through its negative relationship with avoidance coping and positive relationship with active coping No direct relationship between social support and psychological distress after controlling for coping
2	Cook [90]	Functional aspects of support including reliance alliance, attachment, guidance, nurturance, social integration and reassurance of worth: Social Provisions Scale [120]	<i>Chronic life stressors</i> : Urban Life Stress Scale [121] <i>Coping</i> : Strategic Approach to Coping Scale [122] <i>Depression</i> : CES Depression Scale [114] <i>Anxiety</i> : Spielberger State Anxiety Inventory [123]	Direct main effects Main effects, as mediated by coping strategies	<i>Evidence of direct main effects but not main effects mediated by coping</i> : Social support directly associated with pro-social coping subscales, but these were not associated with anxiety or depression Attachment social support subscale directly associated with lower anxiety No significant relationship between social support and depression
3	Gay [96]	Social support network size/availability and satisfaction with support: Social Support Questionnaire six-item version [113]	<i>Stressors</i> : Stress measures not included in analysis <i>Depression</i> : Beck Depression Inventory [124] Maternal Effect and engagement: direct observation <i>Coping</i> : Coping strategies inventory [125]	Direct main effects Main effects, as mediated by coping strategies	<i>Evidence of both direct main effects and main effects mediated by coping</i> : No direct association between social support availability and psychological distress Higher social support satisfaction directly related to less psychological distress Indirect relationship between more social support satisfaction and availability and less distress through less disengaged coping

Table 2 continued

Study	Reference	Social support dimensions and scales used	Stressors, coping and health outcomes measured	Pathways explored	Findings in relation to associations between social support and health outcomes
4	Hough et al [85]	Composite social support score computed from two tools, measuring: a) Functional aspects of social support (including adequacy and satisfaction): Brief Questionnaire [126] b) Structural aspects of social support: Convooy model of social networks [127]	<i>HIV-associated maternal stressors</i> : General Symptom Subscale of the HIV Assessment Tool—Revised [128] <i>Coping</i> : Dealing with Illness Inventory [98, 99] <i>Emotional distress</i> : Profile of Mood States [129]	Direct main effects Main effects, as mediated by coping strategies	<i>Evidence of both direct main effects and main effects mediated by coping</i> : Higher level of maternal HIV-associated stressors associated with greater maternal distress through more passive coping (but not active coping) Social support directly associated with less emotional distress Social support indirectly associated with less emotional distress through more active coping
5	Klein et al [88]	Mother's Emotional Support from Child: Mother's Emotional Support Provided by Child Questionnaire (MESCP), designed by authors to assess how often a mother relies on her child as a source of emotional support Mother's Perceived Parenting Support: Modified form of the Parenting Convergence Scale [130] Mother's Perceived Support from Neighbours and Friends: Social Support Scale (derived from 132)	<i>Stress</i> : no measure of stress used, though maternal HIV infection (HIV status) represents key stressor <i>Psychological Distress</i> : measured with Brief Symptom Inventory (BSI) [132] and rated using the Hamilton Rating Scale for Depression [133]	Stress-buffering (explored through interaction terms in regression analysis) Main effects	<i>Evidence of main effects but not stress-buffering</i> : Higher levels of support from neighbours and friends and parenting support associated with less psychological distress Higher levels of emotional support from children associated with greater psychological distress No evidence of stress-buffering effects of social support (i.e. social support moderating the relationship between stress and distress)
6	Leslie et al. [84]	Respondents asked to list the most important people in their lives. Social support variable computed from answers to the following questions, for each person listed: 1) how supportive they are regarding the illness, 2) how often they see that person and 3) how often they discuss their illness with that person	<i>Stress</i> : no measure of stress or stressors included in analysis, though outcome variable suggests HIV/AIDS symptoms are a key stressor <i>Coping</i> : 76-item Coping with Illness Questionnaire derived from the Dealing with Illness scale [98] <i>Distress over HIV or AIDS symptoms</i> : 5 indicators created from 23 item questionnaire [103, 134]	Direct main effects Main effects as mediated by coping strategies	<i>No evidence of direct main effects or main effects mediated by coping</i> : No direct or indirect relationship between social support and distress over HIV and AIDS symptoms

Table 2 continued

Study	Reference	Social support dimensions and scales used	Stressors, coping and health outcomes measured	Pathways explored	Findings in relation to associations between social support and health outcomes
7	Mellins et al. [87]	Functional dimension of social support (includes availability and adequacy of various types of social support): Multidimensional Social Support Inventory [135]	<i>Stressful events</i> : Psychiatric Epidemiology Research Interview [136] <i>Psychiatric disorder</i> : Structured Clinical Interview for DSM [137] <i>Psychological distress</i> : short form of the Demoralization Scale of the Psychiatric Epidemiology Research Interview [138]	Stress-buffering (explored through interaction terms in regression analysis) Main effects	<i>Evidence of main effects but not stress-buffering</i> : More social support directly associated with less psychological distress and less psychiatric symptoms No evidence of the stress-buffering (moderating) effect of social support on distress
8	Miles [139]	Satisfaction with support from family and friends in relation to child-rearing: Satisfaction with Support subscale of the Stress Support Scale [139]	<i>Depression</i> : Centre for Epidemiological Studies Depression scale [114]	Main effects	<i>No evidence of main effects</i> : No significant relationship between satisfaction with support for child-rearing and depression
9	Murphy et al. [80]	Social support network in relation to emotional support, physical assistance and negative interactions: Arizona Social Support Scale [140, 141]	<i>Disease severity</i> (measured by CD4 cell count) <i>Depression</i> : Hamilton Depression Inventory [142] <i>Anxiety</i> : four items assessing health-related anxiety within the past week: troubles with sleeping, eating, socializing and school/work activities in reaction to thinking about HIV/AIDS and health [143] <i>Reported physical health</i> : Physical functioning, bodily pain and vitality subscales from the Medical Outcome Short Form 36 [144]	Main effects	<i>No evidence of main effects</i> : No significant association found between social support and any of the health outcomes
10	Robbins et al. [81]	Social network size/availability and satisfaction with support: Social Support Questionnaire six-item version SSQ6 [113]	<i>Stressor</i> : disease progression, indicated by average monthly reduction in CD4 count <i>Anxiety and Depression</i> : SIGH-AD [145]	Stress-buffering (tested through separate regression analysis for participants with low and high levels of support)	<i>Evidence of stress buffering</i> : Social support satisfaction moderated the relationship between negative changes in health status (CD4 count changes) and psychological distress: average monthly decrease in CD4 cell count predicted psychological distress only among women with low social support satisfaction No evidence of a moderating effect of social support network size

Table 2 continued

Study	Reference	Social support dimensions and scales used	Stressors, coping and health outcomes measured	Pathways explored	Findings in relation to associations between social support and health outcomes
11	Rotheram-Borus et al [83]	Functional aspects of social support (perceived availability of types of support): Medical Outcomes Study Social Support Scale [146]	<i>Depression</i> : 15-item screening test developed and used previously in Thailand [147] <i>Perceived physical health</i> : three items from the MOS-HIV Health Survey Manual [148] <i>Quality of life</i> : Thai version of the Short Form (26 items) of the WHO Quality of Life Questionnaire [149, 150]	Main effects	<i>Evidence of main effects</i> : Higher levels of social support directly associated with less depression Higher levels of social support indirectly associated with better perceived physical health through less depression and better quality of life
12	Sharts-Hopko et al [95]	Perceived social support availability and conflict/perceived cost of support: short form of the Interpersonal Relationship Inventory (IPRI) [151]	<i>Stressors</i> : no specific measure of stress used, though potential stressor variables included unemployment and length of child's illness <i>Coping</i> : Problem-focused coping subscale from the Ways of Coping Revised Checklist [65, 152] <i>Psychological Distress</i> : The Brief Symptom Inventory [132]	Direct main effects Main effects, as mediated by problem-focused coping	<i>No evidence of stress-buffering and main effects only of the cost of support subscale</i> : No significant relationship between the social support subscale and distress Perceived cost of support subscale associated with less psychological distress
13	Silver et al [89]	Structural and functional dimensions of support systems: Multidimensional Social Support Inventory [153]	<i>Psychological distress</i> : Psychiatric Symptom Index [154]	Main effects	<i>Evidence of main effects</i> : More social support associated with higher depressive symptoms Higher perceived adequacy of support associated with less distress (though relationship is weak)
14	Stock [82]	Perceived support availability: questions from the Social Support Scale [131] Received social support: 2-item subset of questions from a semi-structured interview instrument, the Descriptive Interview [92]	<i>Physical health status</i> : medical chart review to abstract data on CD4 count and CDC staging (Centers for Disease Control's classification system to categorize progression of HIV disease, based on both CD4 count and opportunistic illnesses; [155]) <i>Perceived health</i> : participants asked how they would describe their physical health	Main effects	<i>Evidence of main effects</i> : Direct positive relationship between perceived emotional support and better health (as measured by CD4 count and CDC staging) Negative relationship between perceived economic dependence on others and CD4 count Daily dependence on others was positively associated to subjective health No relationship between received support and health outcomes Perceived economic dependence inversely related to health measured by CD4 count

Table 2 continued

Study	Reference	Social support dimensions and scales used	Stressors, coping and health outcomes measured	Pathways explored	Findings in relation to associations between social support and health outcomes
15	Wyatt [86]	Social network size and satisfaction with support: Abbreviated version of the Social Support Questionnaire SSQ6 [113]	<p>Hopelessness: Hopelessness scale [156]</p> <p>Depression: CES Depression scale [114]</p>	Stress-buffering (explored through interaction terms in regression analysis)	<p><i>Evidence of stress buffering:</i></p> <p>Social support, especially satisfaction with support, is associated with less hopelessness among mothers under high, but not low, stress, and for mothers with low internal locus of control</p>
Population: caregivers of children affected by HIV/AIDS					
Study	Reference	Social support dimensions and scales used	Health and coping outcomes measured	Pathways explored	Findings in relation to associations between social support and health outcomes
16	Ryan [79]	Functional and structural dimensions of social support from friends, family and children: No psychometric scales used; support levels measured by computing combined scores of selected questions asking the caregiver to identify number of sources, perceived level of support, time spent together and/or satisfaction with support	<p>Stressors: HIV status; illness management (based on the number of hospital visits and doctor's appointments on behalf of the child for the previous six months)</p> <p>Stress and Arousal: Stress-Arousal Checklist [91]</p>	<p>Stress-buffering (explored through interaction terms in regression analysis)</p> <p>Main effects</p>	<p><i>Evidence of stress-buffering and main effects:</i></p> <p>Support from friends positively associated with caregiver arousal</p> <p>No direct effect of support from child on caregiver arousal, but child support's interaction with illness management associated with caregiver arousal.</p> <p>Suggests support from the ill child significantly buffers the negative effects of illness management upon the caregiver's level of arousal, i.e. that caregivers with positive relationships with the infected and/or affected child have sufficient levels of arousal despite increasing amounts of illness management tasks</p>
17	Rose and Clank-Alexander [78]	Article does not specify scale or assessment questions for social support. Refers to 'general support from family and friends' with support from family and support from friends analysed as two separate variables	<p>Perceived physical, psychological and social wellbeing: Padilla Quality of Life inventory [93]</p> <p>Coping: 40-item Jalowiec Coping Scale [157]</p>	Main effects	<p><i>Evidence of Main effects:</i></p> <p>Support from family/friends positively related to the quality of life subscales (physical, psychological and social)</p>

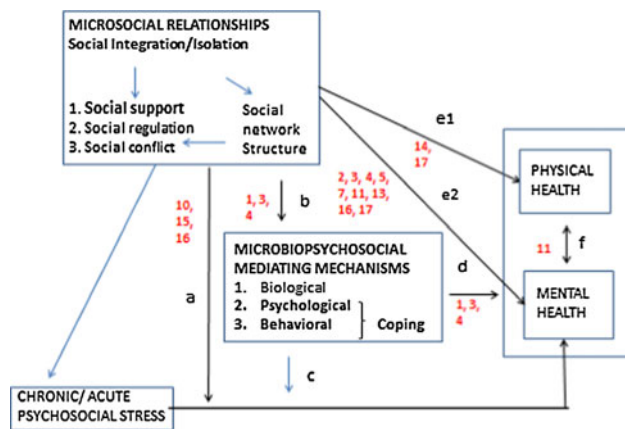


Fig. 2 Adapted version of a section of the House et al [1] model above, illustrating associations between social support and health found by relevant papers. The numbers next to each arrow indicate the numbers, as per Table 2, of studies that found significant associations represented by the arrow

interaction terms in regression analysis (pathway *a* in Fig. 2). Robbins et al [81] found that social support satisfaction moderated the relationship between change in health status (as measured by change in CD4 cell counts) and psychological distress. Specifically, among HIV-positive mothers with low social support satisfaction, average monthly decrease in CD4 cell count predicted increased psychological distress; instead, for participants who reported high support satisfaction, there was no evidence of a similar relationship between this indicator of physical health status and distress. Moreover, the authors' analysis did not expose significant relationships between social network size and distress, suggesting that it is the quality, rather than quantity, of social support that moderates these mothers' psychological distress reactions [81]. Wyatt [86], instead, focused on the construct of hopelessness and found social support, especially satisfaction with support, to be a predictor of less hopelessness for HIV-positive mothers under high stress, but not for mothers with low stress.

Working with a sample of 212 caregivers of children infected or affected by HIV/AIDS, Ryan [79] found that the interaction of support received from the child cared for with illness management (an indicator of the number of hospital and doctor's visits made on behalf of the child over the previous 6 months) had a significant impact upon the caregiver's arousal levels (defined as an active response to the perceived favourability of the external environment). However, no significant main effects of the child's support on caregiver arousal were found. The author concluded that while some sources of support may have a direct effect on carers' mental health, others, such as support from children, may buffer the mental health effects of stressors related to child illness.

Main Effects of Social Support on Health Outcomes

Ten studies found evidence of at least one significant direct association between at least one dimension of social support and at least one mental or physical health outcome explored. In the majority of cases, the direction of associations found was positive, however three studies also document negative relationships, for which authors provide possible explanations included below. Findings related respectively to main effects on mental health (represented by pathway *e2* in Fig. 2) and physical health (represented by pathway *e1* in Fig. 2) are described below. Moreover, three studies found evidence of indirect main effects of social support on mental health, mediated by coping processes (represented by the *b/d* pathway in Fig. 2).

Direct Positive Associations Between Social Support and Health

Seven studies provide evidence of a positive association between social support and mental health outcomes, two studies found social support to be positively associated with physical health outcomes, and one study's findings suggest an indirect effect of social support on physical health through its association with mental health.

Five studies found a positive relationship between a functional measure of social support (perceived availability or adequacy) and a measure of psychological distress among HIV-positive caregivers. Mellins et al [87] found that increased social support was associated with fewer mental health outcome symptoms among HIV infected mothers of young children. Various dimensions of social support were found to directly impact psychological distress and psychiatric disorder. While some of these associations held across stress levels (i.e. availability of support on psychiatric symptoms and adequacy of support on Demoralization), others were significant only for mothers experiencing low levels of stress (e.g. more negative support with more demoralization and more support adequacy with less psychiatric symptoms), suggesting that at high levels of stress the impact of this stress on mental health might be too large to witness the support impact [87]. Hough et al [85] found social support to have a direct effect on distress among HIV-positive mothers even after accounting for its indirect effect on coping behaviour. Gay [96] found that social support satisfaction was directly associated with less self-reported psychological distress. Klein et al [88] showed that higher levels of parenting support and support from neighbours and friends, were associated with less psychological distress. Rotheram-Borus et al [83] found functional dimensions of social support to be significantly correlated with better quality of life and less depression among Thai parents living with HIV. Silver et al [89] found that higher rated adequacy

of support was negatively associated with psychological distress among mothers with late stage HIV/AIDS, although its relationship to distress was quite modest. Only one study [90] focused on anxiety as an outcome and found that greater emotional closeness or attachment in relationships was associated with less anxiety among HIV-positive mothers of young children.

Two studies found evidence of direct associations between social support and a mental health-related outcome among carers of children affected by HIV/AIDS. Ryan [79] found that support from friends had a main effect on caregiver arousal level; the construct of arousal was defined as the active (positive or negative) response to external environment stress, as opposed to ‘stress’ which would represent the internal response [91]. Rose and Clark-Alexander [78] found that support from family and friends was significantly related to better reported psychological and social quality of life among non-parental caregivers of children affected by HIV/AIDS.

In addition, two studies reviewed found a direct positive relationship between social support and physical health indicators [78, 82]. Stock [82] found that perceived emotional support from others and support from friends and neighbours were the most important factors positively influencing health status of HIV-positive mothers (as measured by CD4 count and CDC staging); this was not the case, however, for received support. More specifically, emotional support and support from friends and neighbour were positively associated with better health status. Moreover, a measure of daily dependence (aimed at determining whether the participant had people who could help and how much he/she depended on them for emotional, economic help and daily coping [92] was associated with better subjective physical health. Rose and Clark-Alexander [78] showed that support from family/friends was significantly related to quality of life among non-parental caregivers of children with HIV/AIDS; this quality of life measure included a subscale measuring physical wellbeing and indicators of illness symptoms [93].

Rotheram-Borus et al.’s [83] study also suggests a possible indirect positive effect of social support on physical health through mental health, by including respective pathways between social support and mental health and mental health and physical health in the same model. As indicated above, the authors found social support to be significantly correlated with better quality of life and less depression; in turn, less depression was associated with better ARV adherence and better perceived physical health. This pathway is represented by the bidirectional arrow *f* included in Fig. 2, intended to illustrate potential associations between mental and physical health outcomes. However, it may also be considered to represent an example of a psychological process through which social support has a main effect on physical health (pathway *b/d*) [1].

Direct Negative Associations Between Social Support and Health

Two studies found a negative relationship between a dimension of social support and a mental health outcome and one study found a negative relationship between social support and a physical health outcome.

Silver et al.’s [89] analysis showed that receiving more social support was significantly related to higher depressive symptoms among low income mothers with late stage HIV/AIDS. Authors concluded that this probably reflected greater mobilization of the support system among the women experiencing the most distress. Instead, Klein et al [88] found that, while support from neighbours and friends was associated with less psychological distress, higher levels of emotional support from children cared for were associated with greater psychological distress. An explanation for this finding offered by the authors was that support from children could reflect the absence of adult sources of support, which are generally preferred [94], as well as the inability of the child to meet the adult’s emotional needs. It is also worth mentioning that Sharts-Hopko et al [95] found that the perceived cost of social support was inversely associated with psychological distress among HIV-positive mothers; however this has not been included among reported negative associations between social support and health, since the cost of support is a distinct concept from that of availability of social support.

Stock’s [82] analysis also found a negative relationship between one component of a perceived social support scale and physical health. Specifically, perceived economic dependence was found to be inversely related to CD4 count among HIV-positive mothers in her study, thus associated with worse health status. However, as the author suggested, it is likely that the inverse direction of causality held in this case; that is that HIV-positive women with more advanced HIV illness were more likely to be unable to work and hence economically dependent [82]. Hence this construct may not have been the most appropriate to measure perceived support in relation to health in this situation, as it likely indicated support needs rather than availability.

Evidence of Indirect Effects of Social Support on Mental Health Through Coping Processes

While five studies found evidence of a direct association between social support and coping styles or processes [60, 77, 84, 85, 90, 96], only three of these studies also found a significant relationship between these coping processes and carer mental health outcomes, thus suggesting a main effect of social support as mediated through coping styles (pathway *b/d* in Fig. 2).

Prado et al [77] and Burns et al [60] found that, among low-income HIV-positive mothers, a larger social support network was a significant predictor of more support coping and active coping and less avoidant coping, indicating that more available supportive persons were associated with more utilization of support (support coping), the use of positive reframing, planning and taking action as coping responses (active coping) and with less use of avoidant coping such as disengagement, distraction and suppression of thoughts [97]. In turn active coping was associated with less psychological distress and avoidant coping with greater psychological distress. Thus, social support network size was posited to have an indirect (positive) effect on distress through these two coping strategies. Once controlling for coping, no significant direct relationship between social support and psychological distress was found, suggesting that the effect of social support on distress occurred entirely through its effect on coping, in line with stress-process models.

Similarly, Hough et al's [85] findings suggested a positive effect of both functional and structural aspects of social support on the use of active meaning-making coping, which in turn was associated with decreased emotional distress in mothers. Active meaning-making coping referred to forms of active and support coping employed specifically to cope with illness, such as: active cognitive efforts to deal with the appraisal of the stressfulness of the illness; active-behavioural efforts that deal with problems related to illness and reliance on others for support [98, 99].

In her work with HIV-infected mothers of HIV-infected children, Gay [96] also found evidence of a relationship between social support and these mothers' psychological distress, mediated through coping processes. Specifically, more social support availability and satisfaction were associated with a less disengaged coping style; less disengaged coping was in turn associated with less self-reported psychological distress. The disengaged coping construct used in this study was similar to passive or avoidance coping variables in the studies cited above; it included behaviours such as problem avoidance, self-criticism and self-withdrawal. Unlike the Prado et al [77] and Burns et al [60] study, however, both Hough et al [85] and Gay [96] found significant residual main effects of social support on distress levels once controlling for coping; this suggested that the effect of social support on these carers' mental health occurred in part through other channels.

Conclusion

Summary of Findings

In discussing study findings we refer back to the theoretical framework presented in Fig. 1 and the key questions we

sought to answer. In terms of the existence and direction of relationships, the majority of studies reviewed found evidence of a significant positive association between at least one dimension of social support and at least one health outcome among HIV-positive carers of children or carers of children affected by HIV/AIDS. In particular, findings confirm the importance of social support for the mental health of these caregivers, as most studies focused on mental health outcomes.

Findings were not, however, consistent across studies, as a minority of studies did not find significant associations or even found negative associations (i.e. social support associated with worse health outcomes). This is in line with previous research on social support which suggests that protective effects of this support on mental health are not uniform across groups in society [100]; outcomes may differ depending on the interaction between the type of stressor, the type of social support and the individual context [101] and in some cases social support responses can even be 'negative' [100, 102]. Outcomes are also closely linked to constructs and measurement tools utilised; as indicated above, the choice of these variables may explain some of the negative relationships observed in these studies. Overall, findings of studies reviewed do appear to confirm the importance of perceived availability and adequacy of support for health outcomes, though it is difficult to draw strong conclusions from this review as fewer studies explored structural dimensions of support.

Consistent with previous research, most studies found evidence of either stress-buffering or main effects of social support or both. Though evidence for main effects was stronger, it should be noted that a much larger number of studies explored main versus stress buffering effects. Nevertheless, this beckons attention to Lakey and Orehek's [54] argument that more attention should shift towards a better understanding of the more frequently-observed main effects and the processes that may explain these. It should also, however, be noted that in the case of stress-buffering of specific stressors explored through moderation analysis, associations between outcomes will invariably depend on the stressors and indicators chosen. The lack of an expected outcome may also indicate that the stressors explored are not the most significant for the population in question and/or those for which social support plays a key role in attenuating mental health effects. A similar argument can be made for SEM models that fail to find significance for (all) expected associations between stressors explored, specific coping responses and distress.

In terms of a greater understanding of the microbio-psychosocial processes explaining the effects of social support on health outcomes [1], the studies reviewed offer little insight beyond exploring coping processes as a mediating factor for main effects. Findings suggest that

social support can positively affect mental health among HIV-positive carers by increasing the likelihood of active strategies (including seeking support and dealing constructively with stressors) and decreasing the likelihood of passive strategies (e.g. avoidance, emotion-based coping) in coping with stress. With reference to the House et al theoretical framework presented above (Fig. 1), this suggests that social support is influencing health among HIV-affected caregivers both through psychological (appraisal) and behavioural processes related to coping. Interestingly, these studies assessing coping as a mediator only test for and find *main* effects of social support mediated through coping, despite the fact that coping processes are more typically associated with stress-buffering. This does not, however, exclude the existence of stress-buffering effects mediated through similar coping processes. Also, it should be noted that not all studies in this review showing associations between social support and coping styles provide evidence of these effects translating into better health outcomes. Further, two of the three studies showing indirect effects on health through coping also show a residual direct relationship between social support and health, suggesting that there are co-existing alternative processes through which social support is influencing health in this population. One study reviewed [103] also provides evidence that social support may be positively influencing physical health through mental health, which could be considered an example of a psychological mediating process [1].

Methodological Strengths and Weaknesses of Studies Reviewed

The articles retrieved had a number of strengths. For example, most were peer-reviewed articles published in academic journals, suggesting a high standard and level of scientific rigour. Also, most were based on a theoretical framework (e.g. stress-coping models) or clear arguments based on existing empirical literature. The majority of studies employed multivariate analytical methods or structural equation modelling, which allowed for the assessment of the relative importance of key variables and mediation analysis.

Instead, a key weakness of these studies was their limited geographical and population focus. Only three of the studies worked with carers of AIDS-affected children and only one study worked with a sample of mainly non-biological caregivers. Also, most studies were dated (1990s and early 2000s). Sample sizes were relatively small and most samples were recruited from clinics (versus household surveys) so they were not representative of the general population of caregivers. In the case of four studies analysis was limited to bivariate tests, which do not allow for mediation or moderation analysis or to control

simultaneously for multiple variables contributing to the variance in health outcomes. Also, while SEM models construe causality based on theory, longitudinal data would be better suited to explore causality. In fact the analyses of most of the studies were cross-sectional and most [14] did not work with a control group of HIV-negative caregivers, thus limiting the ability to infer causality [104] or to compare outcomes between HIV-positive and other carers. More generally, the possibility of reverse causality (i.e. the effects of health status on social support) is widely recognised as a limitation by authors in this field; however it has been argued that these ‘reverse’ effects cannot sufficiently explain consistent findings of relationships between social support, health outcomes and mortality rates [1].

It should also be highlighted that where studies only test for one type of effect (stress-buffering or main), it is not possible to conclude that the other is not present. Similarly, where mediating pathways are not explored, it is not possible to know the biopsychosocial processes through which effects occur [1]. For example, if stress-buffering is observed but coping processes are not explored as mediating variables, it is not possible to determine whether buffering effects observed occur through coping or other pathways.

Gaps for Future Research and Practice

Based on both the methodological limitations of studies and the theoretical framework presented in Fig. 1, a number of gaps and opportunities emerge for future research and practice. Firstly, given the location, dates and methodological limitations of studies reviewed, there is clearly a need for research exploring the association between social support and health outcomes of HIV-positive caregivers in Southern Africa and other parts of the developing world. In these areas most affected by the HIV/AIDS epidemic, experiences of caregiving and health challenges are no doubt significantly different from those faced by populations in the USA. There is also a need for larger studies with samples that are more representative of general caregiver populations. Moreover, this review exposes a dearth of studies on the relationship between social support and health among caregivers who are not necessarily HIV-positive themselves but are looking after AIDS-affected children, as only two of the 17 studies focused on this population. In particular, further attention should be paid to research with caregivers of non-biological children, such as grandparents or older carers, who are taking on increasing caregiving responsibilities in the context of high young adult mortality [105]. Longitudinal research would also be important to better understand the causality of associations between social support and health, and studies with

HIV-negative control groups with similar socio-demographic characteristics would allow one to identify similar and differing outcomes between HIV-affected and other caregivers.

With reference to the theoretical framework above [1], three key gaps are evident. The first is the need to focus further on the effects and processes through which social support may influence *physical* health among HIV-affected caregivers, including effects on illness progression and effectiveness of treatment. While these studies provide some evidence of positive associations between physical health outcomes and social support, most of the research to date has focused on mental health outcomes. Further attention should also be dedicated to investigating the extent to which effects on physical health outcomes may be mediated by or associated with mental health outcomes. Second, as the large majority of studies included in this review investigated main effects, further focus among this population should be afforded to testing stress buffering effects as well as these main effects, specifically with regard to HIV/AIDS-related and caregiving-related stressors.

Third, while study findings point to both stress-buffering and main effects on health, further research is needed to obtain a better understanding of the mechanisms or processes through which these effects occur. This is true for both main and stress-buffering effects. For example, we did not come across any studies exploring the potential physiological processes through which social support may influence physical or mental health in this specific population, or the potential behavioural or psychological mediating processes beyond coping. Examples could include advice or encouragement that leads an individual to engage in healthier behaviour, or broader aspects of social relationships that increase self-esteem and a sense of identity. For example, while conducting the literature search we came across a number of studies that suggested social support may be an important factor for better treatment adherence among HIV-positive carers (see for example: [106, 107]); however these studies did not link health behaviours to measured health outcomes. Moreover, none of the studies reviewed provided evidence of mediating processes in relation to stress-buffering.

House et al [1] argue that only studies investigating the interrelationships between multiple social, psychological, behavioural and biological processes can provide a greater understanding of the effects of social relations on health [1]. Based on the findings of this review there remains much to be explored among this population. However, while simultaneously studying the multiple potential pathways through which the functional aspects of social relationships may affect health would no doubt be extremely useful, it would likely be too complex and costly an

endeavour for most individual studies. Perhaps, however, this could best be achieved through research partnerships or a longer-term research programme.

Lastly, should research continue to confirm the importance of social support for HIV-affected carers, ultimately this evidence would need to be applied to inform and evaluate interventions aimed at boosting availability of social support and its effects among most at-risk households and communities in HIV-endemic contexts. However, even in the developed world similar applied research appears to be fairly new and has, to date, shown mixed results. Both Mason and Vasquez [108] and Davies et al [109], for example, document the implementation of programmes employing group sessions to enhance social support and provide health education and awareness. Though participant feedback has been positive, to date no assessments of health or treatment adherence outcomes have been conducted. Hansell et al [110] report results of a modified case management approach intervention which assisted HIV-positive and HIV-negative caregivers of AIDS-affected children in identifying and accessing support resources; these showed success in boosting social support of the HIV-negative caregivers, but not of the HIV-positive caregivers. The authors suggest that boosting social support alone may be insufficient in buffering the numerous sources of stress faced by caregivers who are dealing with their own health crises [110]. Researchers based at the university of Miami have, for years, been implementing and evaluating interventions defined as ‘Structural Ecosystems Therapy’ (or SET), an extension of family therapy designed to identify and correct maladaptive social interaction between the individual, the family and the broader social environment (e.g. health care providers) [111]. Evaluations through randomised clinical trials have, however shown mixed results, including better adherence to antiretroviral medications, less family hassles and lower psychological distress among low-income African American women with HIV, but not increased family support [111, 112]. It is clear that intervention research in this area still has a way to go and that interventions need to be further developed and refined and their longer-term benefits assessed. Moreover, these programmes may not be appropriate for very different contexts in the developing world, and would have to be adapted for and assessed in these settings.

In sum, the literature discussed in this review confirms the importance of social support for the health of adult caregivers of children affected by HIV/AIDS, but also exposes the large scope for further research, especially in HIV-endemic areas of the developing world. In these contexts, social support may be a resource of greater importance, as caregiving and health challenges are likely greater and formalised institutional support more limited.

Within this area of research, particular focus needs to be afforded to developing and evaluating interventions aimed at boosting available support and its effects on health. In order to do this, however, it is important to better understand not only the outcomes of support on health, but also the pathways and processes through which these effects occur.

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