



Intergenerational Interventions for People Living with HIV and Their Families: A Systematic Review

Hae-Ra Han^{1,2} · Olivia Floyd¹ · Kyounghae Kim³ · Joycelyn Cudjoe¹ · Nicole Warren¹ · Stella Seal⁴ · Phyllis Sharps¹

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Abstract

A variety of interventions have been tested targeting people living with HIV (PLH) and their relationships with their children. The purpose of this study was to synthesize evidence on the goals, types, scope, and outcomes of such intergenerational interventions for PLH. Randomized trials targeting PLH alone or together with their children, published in English, with an intergenerational intervention component were included in this review. Thirteen studies met eligibility criteria. The types and goals of interventions varied greatly but often involved educational sessions with groups of PLH, skill-building sessions, or parental disclosure of HIV status among mothers living with HIV; six studies targeted problem behaviors, resilience, and self-esteem among their children. Two studies addressed general family coping with HIV. Seven studies reported positive outcomes as a result of an intergenerational intervention, with the greatest improvements being observed in those participants with the most stress. Most studies failed to report specific intervention methodology. Due to gaps in the literature noted, future intergenerational interventions targeting PLH should include more diverse groups of PLH. Studies should also explore the impact of intergenerational-based interventions on the mental health of PLH and their families.

Keywords Intergenerational · Intervention · HIV · Parent/child · Systematic review

Resumen

Una gran variedad de intervenciones se han puesto en práctica para analizar y evaluar a las personas que actualmente están viviendo con el VIH y las relaciones con sus hijos. El propósito de este estudio ha sido para sintetizar evidencia de las metas, tipos, alcances y resultados de las intervenciones intergeneracionales que se han hecho de las personas que están viviendo con el virus. Trece de los estudios alcanzaron los requisitos necesarios para ser incluidos en esta revisión literaria. Las metas que se querían alcanzar en las distintas intervenciones variaron gradualmente pero casi siempre contaron con secciones educativas entre los grupos de personas afectadas, secciones para el desarrollo de habilidades y revelaciones de los padres acerca del estado de cero positivo entre las madres viviendo con el VIH. A raíz de una intervención intergeneracional, siete de los estudios realizados reportaron resultados positivos donde se observó un gran avance entre los participantes con un mayor grado de estrés. Varios de los estudios no reportaron una intervención metodológica. Basado en algunas brechas notadas en la literatura científica estudiada, las futuras intervenciones intergeneracionales deberían incluir más diversidad entre los grupos estudiados. Los estudios deberían también explorar el impacto de las intervenciones intergeneracionales en la salud mental de las personas afectadas y sus familias.

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✉ Hae-Ra Han
hhan3@jhu.edu

¹ Department of Community Public Health, School of Nursing, The Johns Hopkins University, 525 N. Wolfe Street, Room 526, Baltimore, MD 21205, USA

² Center for Cardiovascular and Chronic Care, The Johns Hopkins University, Baltimore, MD 21205, USA

Background

HIV is an illness that affects individuals living with the disease and their families. A recent meta-analysis of health survey data from 23 countries across sub-Saharan Africa

³ School of Nursing, University of Connecticut, 231 Glenbrook Road Unit 4026, Storrs, CT 06269, USA

⁴ William H. Welch Medical Library, The Johns Hopkins University, Baltimore, MD 21205, USA

[1] reported that more than one in ten households have a child living with HIV-infected adults. While families of people living with HIV (PLH) are often involved in physical and emotional aspects of the disease, children who live with HIV-infected adults may be particularly affected by immediate ecological systems surrounding them such as families and parents. For example, fathers' sexual risk behavior and belief are known to impact their sons' sexual risk behavior and belief development [2]; therefore, an intergenerational approach provides a relevant context for effective HIV treatment, care, and prevention services [1, 2].

Programs and interventions incorporating an intergenerational component or focus are frequently linked to positive outcomes for adults (or elders), youth participants, or both. For example, several mental and physical health benefits from such interventions have been reported for elders, including the following: reduced loneliness, depression, and social isolation via reading picture books to children in a school setting [3], increased levels of generativity (i.e., care and concern directed towards others) via literacy and math instruction for children [4], and increased levels of physical activity via a Latin dance program (Zumba) involving both adults and children [5]. Similarly, benefits for youth from such interventions are noted in the literature, including increased positive perception of older adults via life review writing programs [6] and enhanced empathy via a series of exchange activities such as cooking, snack preparation, musical programs, or storytelling [7]. While intergenerational interventions often use the adult-to-youth intervention flow, youth-initiated interventions are utilized in some studies to change adult health behaviors such as female youth-initiated messages (mostly daughters) encouraging adult female relatives (mostly mothers) to obtain breast and cervical cancer screening [8] or sanitary practices via health education for school-aged children who work as health communicators in their families [9].

Prior systematic reviews of the interventions using an intergenerational approach addressed maternal-child health and mental health outcomes in samples not restricted to people living with HIV (PLH) [10–12]. A number of intergenerational interventions involving the non-sexual relationship between PLH and their uninfected children have been tested and published [13–25]. Yet, no systematic review has compared intergenerational interventions specifically targeting PLH. The goals, types, and scope of the intergenerational interventions and how such interventions are linked to study outcomes in PLH are unclear. As such, the purpose of this study is to conduct a systematic review and synthesize evidence on intergenerational interventions for PLH and their families. In particular, we are interested in the types, scope, and content

of intergenerational interventions used in PLH. We are further interested in the outcomes for PLH and their children in the intergenerational interventions in each target area as addressed in the literature.

Methods

Literature Search

We followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol for systematic reviews [26] to conduct this systematic review. PubMed, EMBASE, Cumulative Index to Nursing and Allied Health Literature (CINAHL), and Cochrane were searched in November 2015 to identify potential studies from inception. A health sciences librarian identified the Medical Subject Headings (MeSH terms) and keywords used in searching the electronic databases, including “human immunodeficiency virus,” “parent–child relations,” and “randomized controlled trial” (see Online Appendix 1 for a full list of search terms). Searches were restricted to peer-reviewed studies published in English. Hand-searches of references from articles identified during the electronic search were also utilized to add to the list of potential study articles. Another electronic search was completed to identify additional studies that were published between November 2015 and May 2017. An electronic reference collection manager, RefWorks, was used to organize articles and eliminate duplicates.

Study Selection

For purposes of this review, we operationalized an intergenerational intervention as any aspect of an intervention program that specifically addressed the relationship between pairs or groupings of individuals from multiple age groups (e.g., parent/child) in the study methodology. The following inclusion criteria were used to select studies: (1) randomized controlled trials (RCTs), (2) intervention content addresses intergenerational relationships for PLH, and (3) include adult study participants who are HIV+. Studies were eligible for inclusion if they did not include children in the data collection process as long as multiple age groups were included in the intervention targets. We included only RCTs in order to build the strongest evidence to rigorously evaluate the causality between intergenerational interventions and its outcomes. We excluded studies if the intervention was focused only on children because such an intervention almost exclusively addressed safe sex practices and HIV prevention among youth [27, 28], or mental health outcomes for youth [29]; there are systematic reviews already published on such topics [30–33].

The study selection process is depicted in Fig. 1. First electronic database searches in November 2015 yielded 945 records for consideration. One additional article was retrieved for the review process after examining the reference lists of articles obtained from the electronic review. After removing 237 duplicates, 710 articles were obtained. Initial title and abstract screenings of articles with relevance to HIV and features pertaining to PLH and their families were independently reviewed by two reviewers to select articles that met the inclusion criteria. A total of 692 records were eliminated from the review for the following reasons: the study focused on HIV prevention or risk reduction ($n=286$); intervention content only addressed PLH with no intergenerational component ($n=216$); the intervention focused on mother-to-child transmission of HIV rather than

on intergenerational relationships ($n=4$); the study focused on cross-generational sexual activity ($n=3$); study content was otherwise irrelevant ($n=3$); the study is not an RCT ($n=174$); the intervention content and study outcomes only addressed children without PLH ($n=5$); and the study failed to provide an abstract ($n=1$). We then reviewed 18 articles in their entirety. Of these articles, two did not describe the original intervention or an intervention at all; two included HIV/AIDS as the subject matter but did not include participants living with HIV/AIDS; three only reported results of the intervention on children and not on their PLH, and one intervention did not include intergenerational content (although multiple generations were included as participants), yielding nine full text articles.

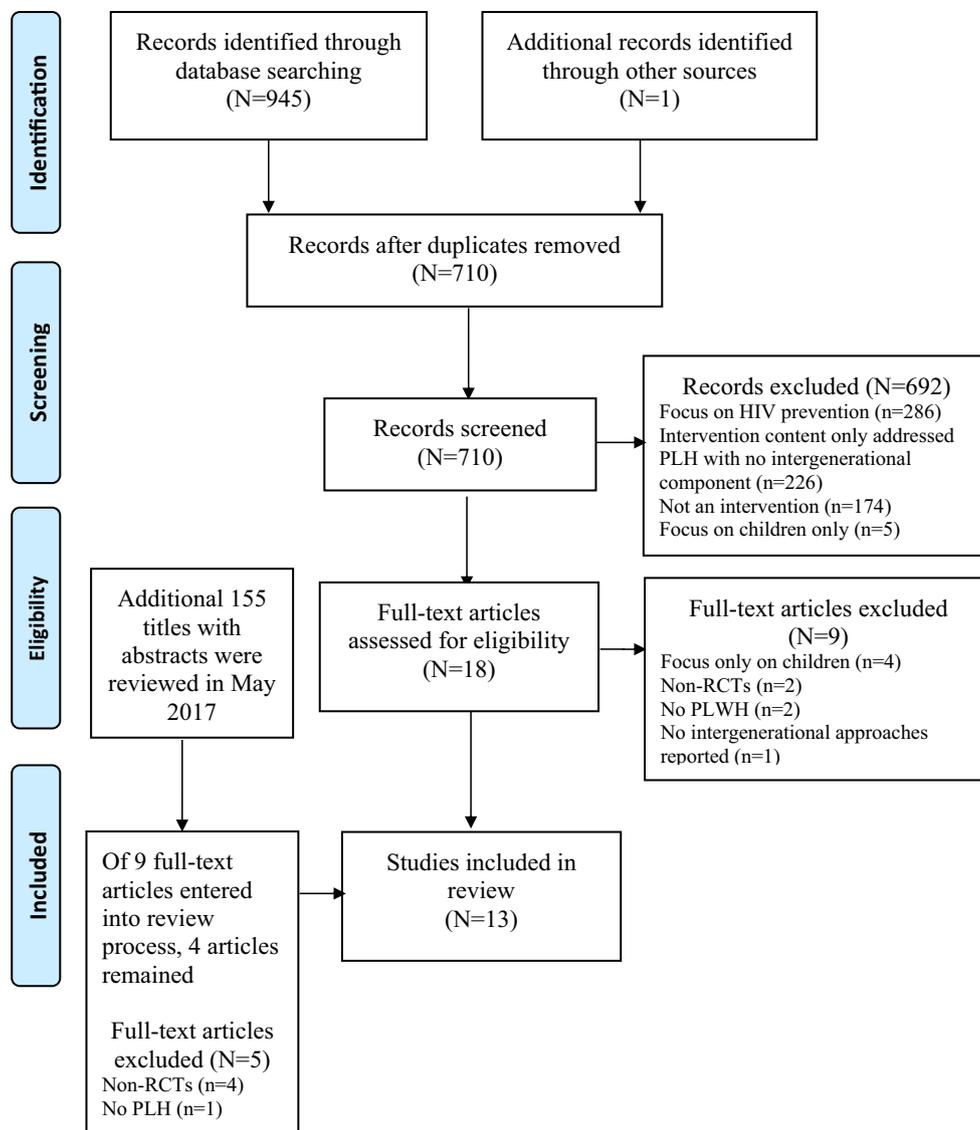


Fig. 1 Article selection for systematic review

In May of 2017, the same search strategy (Online Appendix 1) was conducted to identify studies published after November 2015. After deleting duplicates, 155 titles with abstracts were reviewed for relevance. Two reviewers performed a second independent level of review of nine full-text articles of which four articles were deemed eligible, and five articles were excluded for the following reasons: non-RCTs ($n = 1$) and no PLH ($n = 4$).

Combined, the two searches yielded 13 articles for inclusion in this systematic review (see Fig. 1). All discrepancies were reconciled through discussion between the independent reviewers and the study team. We extracted the following data from the 13 selected articles: (1) method of randomization, (2) sample size with attrition rates, (3) study period with data points, (4) sample characteristics for PLH and their child(ren), (5) intervention goal with theoretical framework, (6) fidelity monitoring method, (7) intervention (vs. comparison) groups, and (8) main study outcomes.

Data Extraction

Once the study selection process was concluded, one author extracted data from the studies using a standard template. Initial data extraction captured both the study characteristics (e.g., randomization method, sample, study period and data points, and goal and type of intervention reviewed) as well as main outcomes related to the intervention. Other team members also reviewed the studies and extracted data related to main outcomes and relevant information associated with the intervention. Extracted findings were compared and discussed until all discrepancies were resolved.

Results

Overview of Studies

Data were extracted using PRISMA protocol [34]. Table 1 includes a summary of the main characteristics of the thirteen studies included in this review. Ten interventions were implemented in the United States [14, 16–23, 25]. Two interventions were conducted in China [24, 25] and one intervention was conducted in South Africa [13]. Populations of studies located in the United States were predominantly African American and/or Hispanic [14, 17, 20, 21, 25, 27]. One of these studies explicitly enrolled only Black/African American participants [25]. Two studies did not disclose the racial/ethnic composition of their sample [13, 16].

Sample sizes ranged from 20 [24] to 719 participants [20, 21], including PLH (mostly mothers) and their children. Studies varied with respect to the children's awareness of their parents' HIV status: Johnson et al. [14] included

children who were unaware at the time of the intervention, whereas the study criteria in the intervention used by Rotheram-Borus et al. [20–22] required that children be aware to participate in the intervention. Four studies examined mothers living with HIV and their children [15–17, 19]. Six studies included parents of both genders along with their children [15, 16, 20–22, 24]. Children of parents living with HIV included in the studies ranged from 4 to 20 years old at the time of intervention. Two studies explicitly focused on PLH and their young children, ages 4–12 [13, 14]. One study focused explicitly on PLH and their adolescent children, ages 11–18 [16].

Randomization methodologies varied. Two studies randomized parent-child dyads as a unit of randomization [13, 16]. Two studies randomized mothers only [14, 17]. Four studies randomized mothers alone, but included their children as participants in the study [20–23]. One study cluster randomized villages as the unit of randomization [14]. One study used urn randomization, a randomization strategy that reduces the risk of experimental bias in small studies [35] by assigning individual participants to one of three tested conditions [25].

Study Quality Rating

Because all studies included in this review were randomized controlled trials, we used the Cochrane Collaboration's tool for assessing risk of bias [34] to evaluate the quality of included studies. Studies were examined for potential biases in the following domains: reporting of findings (selective reporting), attrition (incomplete outcome data), detection (blinding of outcome assessment), performance (blinding of participants and personnel), and sample selection (allocation concealment, random sequence generation). For each bias domain, articles were rated as "low" or "high risk." If there was not enough evidence to assess the article as low or high risk for a given domain, the article was classified as "unclear risk of bias" for that domain. Any discrepancies in evaluation of study characteristics and quality were reconciled after independent evaluation (Table 2 and Fig. 2 for bias assessments).

Three of the thirteen studies had a high risk for reporting bias [18, 19, 22]. Three studies also failed to report attrition [15, 18, 22]. Only one study [17] blinded the outcome assessment, with all other studies at a high risk for detection bias. All studies had a high or unclear risk of performance bias, since participants were aware of their randomization by nature of being included in the intervention sessions or not. All studies except for one [13] either had high or unclear risk of selection bias due to the inherent nature of the intensive intergenerational programs when compared to "standard care." Eight of the thirteen studies adequately reported randomization methodology [13–15, 21–25]. Two failed to report

Table 1 Summary of characteristics of the studies included in the review

Ist author (year) Ref.; country	Randomization	Sample (attrition)	Study period and data points	PLWH characteristics	Child(ren) of PLWH characteristics	Intervention goal (theory)	Fidelity monitoring	Intervention (vs. comparison)	Main outcomes
Eloff (2014) [13]; South Africa	Block randomization of mother-child dyads into 30 study sites	HIV+ mothers (n = 390) and their children (n = 390) Intervention: n = 191 dyads Comparison: n = 199 [22% attrition]	Study dates: not disclosed Interviews conducted at baseline and follow-up at 6, 12 and 18 months in research offices	Race/ethnicity: not disclosed Mean age ± SD: 33.1 ± 5.9 (intervention), 33.1 ± 6.0 (control)	Race/ethnicity: not disclosed Mean age ± SD: 8.4 ± 1.51 (intervention); 8.5 ± 1.46 (control)	Promote resilience in children of mothers living with HIV [Resilience theory]	Community care workers completed quality assurance questionnaires	24 weekly group sessions: 14 skills-based sessions with mothers and children in separate groups and 10 interactive sessions with both mothers and children (vs. provision of information about local resources)	Improvements in children's externalizing behaviors ^a (P = 0.002), communication ^b (P = 0.025), and daily living skills (P = 0.024). No significant difference in internalizing behaviors ^a (P = 0.061), or socialization (P = 0.052). Anxiety ^c increased in intervention group (P = 0.044). No significant effects on maternal psychological measures (P = 0.092).
Johnson (2015) [14]; United States	Individual randomization using computer generated random numbers	HIV+ mothers (n = 80) Intervention: n = 34 Control: n = 46 [24.5% attrition]	Study dates: not disclosed Data collection sessions conducted 2–4 weeks and 6 months after final intervention session	86% Black/African American Mean age ± SD: 32.9 ± 6.9 (intervention); 33.2 ± 8.5 (control)	N/A	Lower parenting stress among mothers living with HIV [Family systems theory; Social cognitive theory; Health self-empowerment theory]	Not disclosed	6–8 parenting support group sessions (vs. health focused intervention group)	No difference between intervention and control arms overall. Mothers in the highly stressed parenting group exhibited greater decreases in overall stress ^d (P = 0.036), parental distress (P = 0.048) and difficult child ratings (P = 0.049)
Li (2014) [15]; China	Cluster randomization using entire village as unit of randomization	79 Families including one HIV+ member, one HIV negative member, and one child living with the parent living with HIV Intervention: n = 38 families Comparison: n = 41 families [Attrition not reported]	Study dates: August 2009–April 2010 Data collection sessions were conducted at baseline, 3 months, and 6 months following initial intervention	100% Chinese Mean age ± SD: 41.9 ± 7.8 (intervention) 40.2 ± 5.2 (control)	100% Chinese Age (%): 52.6% Ages 6–12 (n = 20), 47.4% Ages 13–18 (n = 18) (intervention); 31.7% Ages 6–12 (n = 13), 68.3% Ages 13–18 (n = 28) (control)	Promote resilience in children of parents living with HIV [Not reported]	Not reported	6 small group sessions, followed by 6 home-based family activities and 3 community events (vs. standard care with educational material and health classes)	Improvements in parental care ^e (P = 0.004) and increases in self-esteem ^f for children aged 6–12 (P = 0.047) and adolescents (P = 0.02) and a decrease in problem behavior for children age 6–12 (P = 0.008)

Table 1 (continued)

1st author (year) Ref.; country	Randomization	Sample (attrition)	Study period and data points	PLWH character- istics	Child(ren) of PLWH character- istics	Intervention goal (theory)	Fidelity monitoring	Intervention (vs. comparison)	Main outcomes
May (2016) [16]; United States	Parent–daughter dyads randomi- zed as a unit	HIV+ parents (n = 128) and their daughters (n = 156) Intervention: PWH (n = 65) adolescents (n = 76) Control: PWH (n = 63) adoles- cents (n = 80) [38% attrition]	Study dates: November 1993–March 1995 Data collec- tion sessions conducted at baseline, every 3 months for the first 2 years, and every 6 months for the next 5 years	Race/ethnicity: not disclosed Mean age ± SD: Not disclosed	Race/ethnicity (intervention): 46.1% His- panic/Latino (n = 35), 39.5% Black/African American (n = 30), 4.0% Biracial (n = 3), 10.5% other (n = 8) (control): 52.4% His- panic/Latino (n = 55), 52.4% Black/African American (n = 55), 8.6% Biracial (n = 9) 3.8% other (n = 4) Mean age ± SD: 14.6 ± 2.1 (intervention), 15.2 ± 2.0 (control)	Improve coping and increase age of first child- birth among daughters of PLH through modification of family factors like HIV discl- osure, adoles- cent develop- ment, mental health risk, and behav- ioral risk. [social cognitive theory]	Not reported	8 sessions for parents alone followed by 12 joint sessions for parents and their adolescent daughters (vs. standard case management, counseling, and family support services)	Parental serostatus discl- osure was not increased in intervention group. Age of first childbearing among daughters was delayed by the interven- tion condition, with even greater effects seen in daughters in the interven- tion group who received academic counseling (rel- ative risk [RR]: 0.09, 95% confidence interval [CI] 0.02, 0.30), experienced less emotional distress ^a (RR: 5.74, 95% CI 2.60, 12.68), or perceived their family finances positively (RR: 8.16, 95% CI 2.34, 38.37)
Murphy (2011) [17]; United States	Mothers rand- omized alone, randomization strategy not identified	HIV+ women (n = 80) and their chil- dren (n = 80) recruited as a dyad Intervention: n = 39 dyads Comparison: n = 41 dyads [21.5% attrition]	Study dates: not disclosed Data collection sessions con- ducted at base- line, 3 months, 6 months, and 9 months	79% Hispanic/ Latino, 18% Black/African American, 1% other Mean age ± SD: 37.4 ± 6.8 *demographic differences between inter- vention and control groups not disclosed	79% Hispanic/ Latino, 18% Black/African American, 1% other Mean age ± SD: 8.7 ± 2.0 *demographic differences between inter- vention and control groups not disclosed	Assist mothers living with HIV to disclose their infection status to their children [Family systems theory; integra- tive disclosure theory]	Not reported	3 individual sessions and 1 follow up phone call ^b (vs. stand- ard care and case manage- ment)	Mothers in the interven- tion group were six times more likely to disclose their HIV/AIDS status to their children than the comparison group ^c [odds ratio (OR): 6.33, 95% CI 1.64, 24.46]

Table 1 (continued)

Ist author (year) Ref.; country	Randomization	Sample (attrition)	Study period and data points	PLWH characteristics	Child(ren) of PLWH characteristics	Intervention goal (theory)	Fidelity monitoring	Intervention (vs. comparison)	Main outcomes
Murphy (2015) [18]; (2017) [19] United States	Computer randomized mother–daughter dyads	mother–child dyads recruited through HIV/AIDS service organizations in Los Angeles County. Intervention: n = 23 dyads; Control: n = 14 dyads [18] Intervention: n = 30 mothers; Control: n = 32 mothers [19] [Attrition not reported [18]; 17.2% attrition [19]	Study date: not disclosed Data collection sessions conducted 1–3 weeks following baseline intake	Race/ethnicity (total): 49% African American, 32% Latino/Hispanic, 14% Caucasian, 5% other Mean age ± SD: 37.6 ± 6.1 *demographic differences between intervention and control groups not disclosed	Race/ethnicity (total): not disclosed Mean age ± SD: 10.5 ± 2.1 *demographic differences between intervention and control groups not disclosed	Improve mother–child communication about HIV, improve children knowledge of HIV and reduce child’s anxiety in relation to HIV/AIDS [not reported]	Not reported	3 weekly, 60–75-min sessions in participants home or at a clinic. Sessions for children and mothers were separate, with children placed in sessions based on their age [7–9; 9–11; 12–14 years] (vs. waiting-list control group with delayed intervention)	For those in the intervention group, there were significant increase in knowledge on HIV transmission among children (P < 0.001), no significant difference in maternal HIV knowledge, significant decrease in children’s anxiety and worry ^m (P < 0.01) and in increase in children’s overall happiness ^p (P < 0.05). Significant increase in maternal guidance and integration ^o (P < 0.05). Greater communication and less maternal alienation ⁿ were evident in both groups (P < 0.001) [18] At 12 month follow-up, [19] mothers in the intervention group reported higher levels of parenting efficacy ^q compared to the control group. Children in intervention group showed better support-seeking behaviors, self-reliance, internalizing and lower depression levels than those in the control group. Higher mother–child communication ^s , dependability ^r and security reported in the intervention group compared to the control group

Table 1 (continued)

1st author (year) Ref.; country	Randomization	Sample (attrition)	Study period and data points	PLWH character- istics	Child(ren) of PLWH character- istics	Intervention goal (theory)	Fidelity monitoring	Intervention (vs. comparison)	Main outcomes
*Rotheram-Borus (2000) [20]; (2003) [21]; (2006) [22]; United States	Parents randomized, children participated in the same intervention groups	HIV+ parents (n = 307) with at least one adolescent child (adolescents n = 412) recruited from New York Intervention: PLWH n = 153, adolescents n = 205 Control: PLWH n = 154, adolescents n = 207 [37.1% attrition [27]; 13.8% attrition [17]; attrition not reported [20]	Study dates: August 1993–March 1995 Data collection every 6 months for 2 years [27]; 2–4 years post intervention [17]; 4–6 years post intervention [20]	(intervention): 47% Hispanic/Latino, 33% Black/African American, 12% White/Caucasian, 8% other (control): 43% Hispanic/Latino, 36% Black/African American, 10% white/Caucasian, 12% other Mean age ± SD: 38.12 ± 5.3 (intervention) 37.99 ± 5.9 (control)	(intervention): 51% Hispanic/Latino, 35% Black/African American, 4% White/Caucasian, 10% other (control): 49% Hispanic/Latino, 40% Black/African American, 2% white/Caucasian, 9% other Mean age ± SD: 14.58 ± 2.0 (intervention) 14.77 ± 1.9 (control)	Promote mental and behavioral outcomes and disclosures rates for mothers living with HIV; and improve coping and reduce high risk behaviors among adolescent children [Social cognitive theory]	Quality assurance ratings ensured fidelity to study manual	8 group sessions for parents living with HIV followed by 16 sessions for adolescents and parents (vs. standard care)	Rotheram-Borus (2001) [20] reported that parents did not experience a significant reduction in emotional distress (P = 0.66). Greater reduction in adolescent emotional distress ^a after first 15 months in intervention condition (P = 0.034), not sustained after 15 month follow up (P = 0.40). Problem behaviors (P < 0.001) and conduct problems decreased more among adolescents in the intervention condition. There was no change in disclosure rates across conditions. At 2–4 years post-intervention, [21] parents in the intervention group were less likely to maintain a drug addiction (P = 0.03). Fewer adolescents in the intervention group had children compared to the control condition (P = 0.04). There was no lasting difference at 48 months in emotional distress ^a (P = 0.6135), or self-esteem ^b (P = 0.0227) between adolescents in the intervention and control group. Finally, at 4–6 years post intervention, [22] participation in the intervention predicted less substance abuse among children of PLWH at 6 years (P < 0.05) and more positive parental bonds than at baseline (P < 0.05)

Table 1 (continued)

Ist author (year) Ref.; country	Randomization	Sample (attrition)	Study period and data points	PLWH character- istics	Child(ren) of PLWH character- istics	Intervention goal (theory)	Fidelity monitoring	Intervention (vs. comparison)	Main outcomes
Rotheram-Borus [23]; United States	Computerized randomization assigned moth- ers, children participated in the same inter- vention groups	Mothers (n = 339) living with HIV who were the primary female caregivers of one child aged 6–20 were recruited from HIV clinics Intervention: n = 172 mothers Control: n = 167 mothers [22% attrition]	Study dates: Janu- ary 2005–Octo- ber 2006 Data collection at 6, 12 and 18 months post intervention	(Interven- tion): 64.5% Hispanic/ Latino, 30.2% Black/African American, 2.9% White/Cauca- sian, 4% other (control): 70.7% Hispanic/ Latino, 23.4% Black/African American, 4.2% White/Cauca- sian, 1.8% other Mean age ± SD: 40.8 ± 8.1 (intervention) Mean age ± SD: 39.6 ± 8.2 (control)	Race/ethnicity: Not reported Mean age ± SD: 14.8 ± 2.3 (intervention) Mean age ± SD: 15.0 ± 2.5 (control)	Promote positive family dynam- ics and mental and behavioral health outcomes for mothers living with HIV and their ado- lescent children [social cognitive theory]	Video tapes of sessions moni- tored for treatment fidelity	12 group sessions with mothers and adolescents separately fol- lowed by 4 joint sessions (vs. delayed inter- vention, offered at 18 months)	No difference among moth- ers for most outcomes, but significantly more likely to monitor CD4 counts (P = 0.01) Among adolescents in the intervention condition, frequency of drug use (P < 0.01) and alcohol use (P = 0.02) decreased sig- nificantly but marijuana use increased (P < 0.01)
Simoni (2012) [24]; China	Parent–child pair randomized using a block randomization scheme	HIV+ Manda- rin speak- ing patients (n = 20) with a child between 13–25 years Intervention: n = 10 Control: n = 10 [0% attrition]	Study dates: December 2013–August 2014 Data collection at 4 weeks and 13 weeks after intervention	100% Chinese Mean age ± SD: 45.6 ± 1.5 (inter- vention) Mean age ± SD: 47.1 ± 1.8 (control)	100% Chinese Mean age ± SD: 18.1 ± 3.6 (inter- vention) Mean age ± SD: 18.1 ± 3.7 (con- trol)	Promote parental disclosure of HIV status to children and improve parent–child communication about HIV [Chinese parental HIV disclosure model]	Interven- tionists monitored weekly to ensure fidelity	3 counseling sessions in a clinic led by a study nurse over 4 week period (vs. usual care)	In comparison to the control group at 13 week follow-up parents in the intervention group reported significantly lower odds of stress, and higher odds of HIV status disclosure self-efficacy (P = 0.01)

Table 1 (continued)

1st author (year) Ref.; country	Randomization	Sample (attrition)	Study period and data points	PLWH character- istics	Child(ren) of PLWH character- istics	Intervention goal (theory)	Fidelity monitoring	Intervention (vs. comparison)	Main outcomes
Szapocznik (2015) [25]; United States	Urn randomiza- tion into one of three arms	HIV + African American women with at least one child (n = 209) Intervention (n = 67) Person centered approach (n = 69) Control (n = 73) [38.8% attrition]	Study dates: not reported Data collection at 3, 6, 9 and 18 months post intervention	100% Black/Afri- can American Mean age ± SD: 36.0 ± 8.0 *demographic differences between inter- vention and control groups not disclosed	N/A	Promote positive family dynam- ics in families of mothers liv- ing with HIV [Structural family therapy]	Case notes recorded and videotapes reviewed weekly to ensure fidelity	Family-ecological intervention ^f (vs. attention control ^k vs. community control)	Latent growth mixture modeling revealed that structural ecosystems therapy is more effica- cious than attention- comparison-person centered condition and the control in reducing psychological distress ⁱ and family hassles ^u , but not in increasing family support ^v

Instruments used in measuring key concepts: (a) Child Behavior Checklist; (b) Vineland Adaptive Behavior Scale; (c) Child Manifest Anxiety Scale; (d) Parental Stress Index-Short Form; (e) Parental Bonding Instrument; (f) Rosenberg Self-Esteem scale; (g) Brief Symptom Inventory; (h) Informed by Derlega's model of HIV exposure; (i) Global Severity Index from the Brief Symptom Inventory; (j) Informed by Systems Ecosystem Therapy; (k) Informed by PCA; (l) Disclosure Self-Efficacy Scale; (m) Revised Children's Manifest Anxiety Scale; (n) Parent subscale from the Inventory of Parent and Peer Attachment; (o) Social Provisions Scale; (p) Piers-Harris Children's Self-Concept Scale; (q) Parenting Efficacy Scale; (r) Self-report Coping Survey; (s) Parent-Child Communication Scale; (t) Kerns Security Scale; (u) Hassles Scale; (v) Social Support Questionnaire—Short Form

*Articles published by Murphy [17–19] reported on short- and long-term outcomes for an RCT. Similarly, Rotheram-Borus [20–22] were part of a series that continued to report on outcomes for the same RCT

how groups were randomized to the control and intervention conditions [15, 19]. For three studies, the method by which participants were randomized was not clearly elucidated [20, 22].

Intergenerational Interventions Targeting PLH

Article publication dates ranged from 2001 to 2017; however, included interventions were initiated as early as August 1993, a time when HIV was increasingly becoming a chronic instead of an acutely terminal disease [20]. Intervention goals varied, with some overlap. Six interventions aimed to reduce emotional distress and improve behavioral outcomes for PLH [14, 20–23, 25]. Similarly, five interventions aimed to decrease emotional distress and improve a wide variety of behavioral outcomes among the children of PLH, including sexual behaviors and alcohol and drug use [16, 20–23]. Although three studies explicitly focused on increasing resilience among parents living with HIV and their children [13, 15, 19], only one study provided a conceptual definition of resilience—“the capacity for successful adaptation despite challenging circumstances [13].” Seven studies aimed to improve parent-child communication and HIV serostatus disclosure rates [16, 17, 19, 20, 22–24]. Various theories informed the interventions (e.g., resilience theory, family systems theory, and integrative disclosure theory) but Bandura’s Social Cognitive Theory [36] was used most often, as reported in five articles [14, 16, 20, 21, 23]. Of these, only one article explicitly hypothesized that the studied intervention would improve maternal self-efficacy based on the theory [14].

Most studies included a form of group-based intervention, with separate modules designed for PLH in three interventions [14, 17, 24], the child of the PLH in two interventions [13, 16], and for use with both generations in seven interventions [15, 16, 20–23, 25]. Of the three studies that incorporated group modules for PLH specifically, without their children, Johnson [14] included a supportive group intervention for mothers, similar to some of the supportive group interventions employed in other articles. The children of mothers living with HIV were recruited as part of mother-child dyads and surveyed for parent-child attachment, self-concept (levels of anxiety, happiness and satisfaction) following the intervention by Murphy and colleagues [17], but the children were not included as participants in the intervention sessions themselves.

Eight studies used a health education or standard care condition with educational material or access to standard health care as the control or non-intervention group for their interventions [13–17, 20–22]. Two studies merely delayed the educational session for the control group [22, 23]. One study used alternative established interventions

as the control group [14]. Another study included two comparison conditions, with one condition being no care provided, and the other being standard therapeutic care [25]. Intervention fidelity was assessed in six studies [13, 20–24]. Four studies used quality assurance ratings to ensure fidelity to research manuals [13, 20–22]. Two studies video-recorded intervention sessions as a fidelity monitoring method [23, 24].

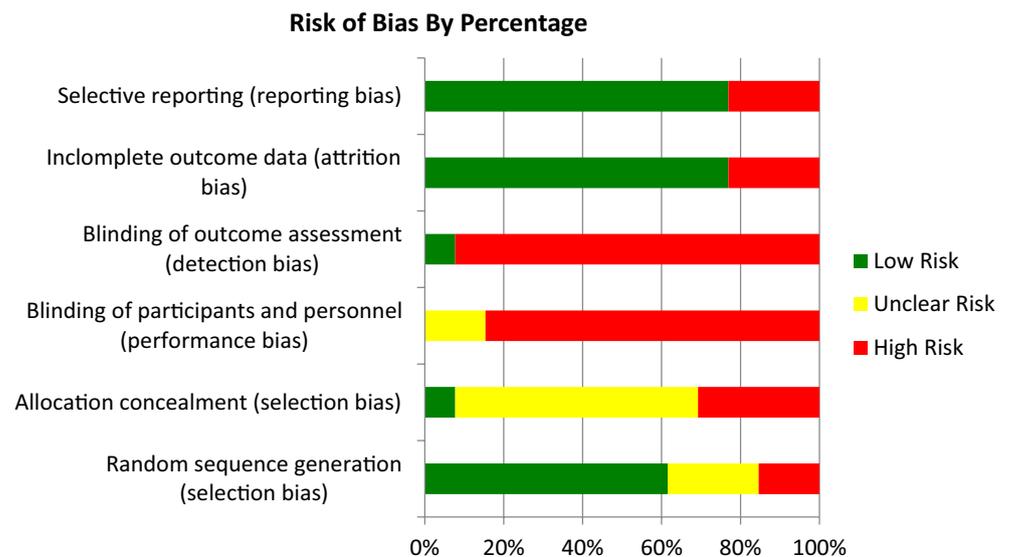
Outcomes of Intergenerational Interventions in PLH

Analyzed study outcomes revealed that intergenerational interventions generally have a positive effect on either parents living with HIV, their children, or both. Intergenerational interventions resulted in positive outcomes related to family dynamics and parent-child communication in seven studies [13–16, 19, 20, 24]. For example, intervention group parents reported perceived improved parental care [15]. Improved parental communication with their children resulted in increased positive coping behaviors and emotional outcomes for children in a few studies [15–18]. One study showed that adolescents participating in a coping intervention with HIV+ mothers were more likely to be older themselves when bearing their first child [27]. Other studies reported that children who received a coping intervention exhibited fewer negative externalizing behaviors [13] and problem behaviors [14, 15, 20, 23] and reported increased self-esteem after participation in the intervention [15].

Intergenerational interventions had mixed results in encouraging parental disclosure of their HIV+ serostatus to children: one study [17] reported a sixfold statistically significant increase in disclosure, while others [16, 20] reported no significant difference in disclosure between groups. Parents in another study reported statistically significant disclosure distress but did not increase actual disclosure rates [24]. Nevertheless, intergenerational interventions resulted in positive health benefits among PLH, such as maintenance of sobriety [21] and increased monitoring of CD4+ count [23]. In contrast, intergenerational interventions seemed to have a negligible effect on depression and emotional well-being among PLH and their families without a baseline psychosocial abnormality. Three articles [13, 20, 22] reported no statistical difference in depressive symptoms or emotional distress among parents living with HIV or their children. One of the studies [13], however, had p-values close to 0.05 showing a trend toward significance. Conversely, two studies reported that, although there was no significant difference in overall maternal stress levels between the intervention and control groups, mothers in the intervention group with high baseline stress levels reported decreased stress by the end of the study [14, 23]. Two other studies reported reduced maternal stress overall [24, 25]. Within the adolescent

Table 2 Risk of bias comparison across studies included in the review

	1st author (year) Ref.												
	Eloff (2014) [13]	Johnson (2015) [14]	Li (2015) [15]	May (2006) [16]	Murphy (2011) [17]	Murphy (2015) [18]	Murphy (2017) [19]	Rotheram-Borus (2001) [20]	Rotheram-Borus (2003) [21]	Rotheram-Borus (2006) [22]	Rotheram-Borus (2015) [23]	Simoni (2015) [24]	Szapocznik (2004) [25]
Selective reporting (reporting bias)	Low	Low	Low	Low	Low	High	High	Low	Low	High	Low	Low	Low
Incomplete outcome data (attrition bias)	Low	Low	High	Low	Low	High	Low	Low	Low	High	Low	Low	Low
Blinding of outcome assessment (detection bias)	High	High	High	High	Low	High	High	High	High	High	High	High	High
Blinding of participants and personnel (performance bias)	High	High	High	High	High	Unclear	Unclear	High	High	High	High	High	High
Allocation concealment (selection bias)	High	Unclear	Unclear	Unclear	Unclear	Low	High	Unclear	Unclear	High	High	Unclear	Unclear
Random sequence generation (selection bias)	Low	Low	High	Unclear	Unclear	Low	High	Unclear	Low	Low	Low	Low	Low

Fig. 2 Comparison of risk of bias

population, reduced adolescent stress enhanced the positive effects of the intergenerational intervention [16].

It is worth noting that two articles are follow-up companion articles [21, 22] that report on evidence 4 and 6 years after original intervention publication [20]. Both studies were included in the review because the original article provided significant insight into the methodology of the large and rigorous study intervention, and the follow-up companion articles included longer-term effects. These follow-up studies indicate positive effects from the intervention described in the areas of substance abuse, age of sexual activity, age of first childbearing, and employment status among children of PLH [20]. Similarly, another article [19] is a follow up article to a previously published feasibility study [18] that provides insight into the outcomes of intergenerational interventions on parent-child communication at 12 months.

Discussion

There has been limited reporting in the literature on intergenerational interventions targeting families of HIV. While available intergenerational interventions tested in randomized trials varied in their scope, methodology, and outcomes, evidence generally supported the use of intergenerational approaches in promoting family dynamics and parent-child communication [13–16, 19, 20, 24]. For example, the IMAGE study, which focused on parenting behavior skills, resulted in significantly improved perceived family dependability, family security, and parent-child relationship [18, 19]. For PLH, these interventions were associated with improved sobriety [21], CD4+ cell counts [23], and, in

the case of parents in the highly stressed parenting group, decreases in overall stress, parental distress, and difficult child ratings [14, 23, 25]. In contrast, the use of an intergenerational approach failed to yield significant changes in psychological outcomes in PLH without preexisting psychosocial abnormalities [20–22]. Intergenerational interventions included in this review had mixed results in improving parental disclosure of their HIV+ serostatus to children [20–22].

The lack of significant improvements in psychological outcomes might be attributable to a number of methodological issues in the included studies, such as short-term follow-up or small samples with insufficient power to detect changes in outcomes. In particular, most a priori sample size calculations were focused on children's problem behavior or parental disclosure of HIV status as a primary outcome [15, 17, 20–23]. The studies rarely provided a priori power analysis to estimate a sufficient size of study sample to be able to detect changes in psychological outcomes. Despite medical advances in the prevention and care of HIV [37, 38], there are emotional and social problems, such as stigma, that may make the burden of disease challenging not only for the infected individual but also for the family [38–40]. Since study findings indicated changes in psychosocial outcomes for individuals with preexisting stress or anxiety [14, 23, 25] but are not statistically significant in other populations, future intergenerational interventions should be expanded in scope to focus more on PLH with preexisting psychological stress.

Despite known benefits in interventions targeting general populations without HIV [2–8], limited use of intergenerational interventions in RCTs for PLH is notable, in that our search of the literature yielded so few RCTs eligible for inclusion, particularly in the international setting where we

identified only three studies (two in China [15, 24] and one in South Africa [13]). It is furthermore notable that intergenerational intervention modalities included in this review involved a form of group-based educational or support group activities most often designed for the HIV+ parent [13, 14, 16, 20–23]. Additionally, children are increasingly being utilized as an effective conduit to health education to the parents with success in studies not designed for PLH [8, 9], but they are not explicitly included as study participants in four studies in this review [14, 17, 23, 25]. Future research needs to expand the nature and scope of the participation of children in intergenerational interventions for PLH.

We identified several methodological challenges in the studies. While attrition ranged from 0% [24] to 39% [25], attrition greater than 20% was observed in more than half of the studies [13, 14, 16–18, 20–23]. Earlier-dated studies attribute attrition to the death of PLH from HIV/AIDS [16, 20]. Attrition in later-dated studies may be due, in part, to logistical barriers such as lack of time to travel, limited transportation, or inconvenient schedule. In other studies, not included in this review, with low attrition rates of PLH, conducting the intervention in the participant's home was both acceptable to the participant and cost effective [41, 42]. Home-based delivery could be considered for future intergenerational interventions.

For reasons not explained in the studies examined, the studies included in this review also lacked complete racial/ethnic diversity. While the majority of the studies included African American or Hispanic participants [14, 16–18, 20–23], none of the ten studies conducted in the United States included Asian Americans and Pacific Islanders. The failure to include Asian Americans and Pacific Islanders in the study sample of studies conducted in the United States limits the generalizability of the study findings. Asian American and Pacific Islanders have experienced the highest increase in HIV infection rates of all racial/ethnic groups [43, 44]. They also have the highest rates of undiagnosed HIV of any U.S. racial/ethnic group [45, 46]. Future studies need to include more diverse populations in the study sample such as Asian and Pacific Islanders to account for the rapid increase of the Asian ethnicity in newly diagnosed HIV populations.

Bandura's Social Cognitive Theory, the most widely cited theoretical framework used in the studies included in the review [14, 16, 20–23], focused primarily on an individual's cognitive process [36]. A more family-based ecological framework may be necessary for the development and evaluation of effective future intergenerational interventions, as most of the studies included in this review utilize group-based programming in their intervention methodology [13–16, 20–25]. For example, based on the Individual-Family-Community framework for HIV research, researchers in a different study employed

a comprehensive approach in examining predictors of the demand for support services [46]. The authors concluded that in addition to individual-level predictors (e.g., age, health status and coping styles), family-level predictors such as family's changeability or living in a family more flexible than deemed ideal were important in receiving chronic HIV care and support [46].

Our review has limitations worth reporting. We included only articles written in English; therefore, the generalizability of the findings concerning studies published in non-English languages is limited. Similarly, we only focused on intergenerational interventions using an RCT design; the findings of this review cannot be generalized to other intergenerational intervention studies using methods such as quasi-experimental design. In addition, some of the methodological issues noted earlier (e.g., short-term follow-up or small samples with insufficient power) may have been related to the restriction to RCTs. Researchers may need to consider an alternative study design when appropriate (e.g., observational study) to allow longer-term follow up and larger cohorts. Another limitation is the heterogeneity in the quality and quantity of data reported in the 13 studies, as we were unable to conduct a more rigorous analysis using meta-analysis. Lastly, our sample did not specifically address large sub-populations of PLH such as men who have sex with men (MSM) and injection drug users. These populations may have unique intergenerational dynamics that are not reflected in the included studies. Given the burden of disease among MSM and injection drug users, the absence of studies that address the inter-generational interventions for these populations is important [47, 48].

In conclusion, our review of 13 articles shows that, interventions incorporating an intergenerational component for PLH can promote positive mental health outcomes for children [13, 15, 16, 18–21], increase positive perceptions of family dynamics [18, 19, 22], and improve communication between generations within families [18, 19]. We were unable to find sufficient evidence to support intergenerational interventions as an approach for improving psychosocial outcomes for PLH and their families, as some of the included studies reported positive psychological outcomes for PLH [24, 25] while others did not [13, 14, 20–23]. While several methodological biases and weaknesses were noted in reference to the intergenerational interventions included in this review, our findings suggest the need for more rigorous and continued evaluations of this approach for a broader range of outcomes and populations.

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Compliance with Ethical Standards

Conflict of interest All the authors declare that they have no conflict of interest.

Research Involving Human Participants This article does not contain any studies with human participants performed by any of the authors.

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