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Mental Health and Retention in HIV Care: A Systematic Review and Meta-Analysis

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Abstract

Objective—Mental health (MH) diagnoses, which are prevalent among persons living with human immunodeficiency virus (HIV) infection, might be linked to failed retention in HIV care. This review synthesized the quantitative evidence regarding associations between MH diagnoses or symptoms and retention in HIV care, as well as determined if MH service utilization (MHSU) is associated with improved retention in HIV care.

Methods—A comprehensive search of the Centers for Disease Control and Prevention's HIV/AIDS Prevention Research Synthesis database of electronic (e.g., MEDLINE, EMBASE, PsycINFO) and manual searches was conducted to identify relevant studies published during January 2002–August 2017. Effect estimates from individual studies were pooled by using random-effects meta-analysis, and a moderator analysis was conducted.

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Results—Forty-five studies, involving approximately 57,334 participants in total, met the inclusion criteria: 39 examined MH diagnoses or symptoms, and 14 examined MHSU. Overall, a significant association existed between MH diagnoses or symptoms and lower odds of being retained in HIV care (odds ratio [OR] = 0.94; 95% confidence interval [CI] = 0.90–0.99). Health insurance status ($\beta = 0.004$; $Z = 3.47$; $p = 0.001$) significantly modified the association between MH diagnoses or symptoms and retention in HIV care. In addition, MHSU was associated with an increased odds of being retained in HIV care (OR = 1.84; 95% CI = 1.45–2.33).

Conclusions—Results indicate that MH diagnoses or symptoms are a barrier to retention in HIV care and emphasize the importance of providing MH treatment to HIV patients in need.

Keywords

meta-analysis [publication type]; mental health; retention in care; mental health services; human immunodeficiency virus

Retention in HIV care, defined as consistency in HIV care appointment attendance over time (Horstmann, Brown, Islam, Buck, & Agins, 2010), increases the likelihood that a person living with HIV (PLWH) will be prescribed and adhere to their antiretroviral medications (Thompson et al., 2012). Among persons living with diagnosed HIV infection in the United States during 2014, 56.9% were retained in HIV care (Centers for Disease Control and Prevention, 2017b). Consequently, not being in care is associated with increased viral load, lower $CD4^+$ cell count, and increased mortality (Rao et al., 2013).

A primary goal of HIV care guidelines is to increase retention in HIV care to achieve viral suppression (White House Office of National AIDS Policy, 2015). PLWH who are virally suppressed (i.e., have an undetectable viral load), have a negligible risk of transmitting the virus to others (Prevention Access Campaign, 2016). Individual and social factors might affect the likelihood that PLWH can achieve optimal retention in HIV care (Holtzman, Brady, & Yehia, 2015).

Mental health (MH) is one individual-level factor that might merit targeted efforts to improve HIV care. PLWH who also have MH diagnoses or symptoms are less likely to achieve viral suppression than those without the additional comorbidity (Yehia et al., 2015). The burden of HIV among those with MH diagnoses or symptoms is far greater than among the general population; approximately half of all PLWH screen positive for one or more psychiatric disorders (Health Resources and Services Administration, 2015).

Research on MH and HIV care has focused on medication adherence (Gonzalez, Batchelder, Psaros, & Safren, 2011; Langebeek et al., 2014; Sin & DiMatteo, 2014). Because adherence is affected by retention in care, understanding how MH is related to retention in HIV care is important for public health practice in attaining the goal of viral load suppression and lowering the HIV transmission risk. In semi-structured interviews with PLWH, mental illness was identified as a barrier to retention in HIV care because it can lead to apathy about health care and missed HIV care appointments (Holtzman, Shea, et al., 2015).

In addition to psychiatric diagnoses, MH treatment is an individual-level factor that might facilitate a patient's retention in care. A previous systematic review of integrated HIV care

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reported an association between MH service utilization (MHSU), other ancillary services (e.g., case management or transportation), and retention in HIV care (Soto, Bell, & Pillen, 2004). Additionally, a positive association between a person's receipt of MH and substance abuse treatment or counseling and retention in HIV care has also been observed (Ashman, Conviser, & Pounds, 2002). Those previous studies assessed MH services in combination with other services (e.g., substance abuse treatment); thus, individual effects (i.e., MH care usage effect on retention) could not be determined.

Although research indicates MH conditions are a barrier to retention in HIV care (Horstmann et al., 2010), other studies have reported that a MH diagnosis increases retention in HIV care (Byrd, Furtado, Bush, & Gardner, 2015; Ulett et al., 2009; Yehia et al., 2015). It remains unclear whether all MH diagnoses or symptoms affect a patient's retention in care equally or whether certain factors modify the association between MH diagnoses or symptoms and retention in care. Additionally, is MHSU associated with retention in care when assessed independently from other ancillary services? This systematic review examined the association between different MH diagnoses or symptoms and retention in HIV care. Secondly, this study examined whether MHSU is associated with retention in HIV care.

Methods

Search Strategy

A systematic review of the literature was conducted, and this report follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Statement (Appendix A) (Moher et al., 2015). The Centers for Disease Control and Prevention's (CDC) Prevention Research Synthesis (PRS) Project's cumulative HIV, acquired immunodeficiency syndrome (AIDS), and sexually transmitted disease (STD) research database was used for identifying relevant reports. The PRS database comprises published literature located through automated and manual searches developed by librarians with expertise in developing and conducting comprehensive systematic searches (DeLuca et al., 2011). The searches included MEDLINE (OVID), EMBASE (OVID), CINHAL (EBSCOhost), PsycINFO (OVID), and Sociological Abstracts (ProQuest) databases. Each of the automated searches were developed in the MEDLINE database with indexing and keyword terms cross-referenced by using Boolean logic with no language limits. The finalized search was translated into the other databases to adhere to each proprietary indexing system. The PRS database comprises search strategies focused on (1) behavioral risk reduction, (2) medication adherence, and (3) linkage to, retention in, and re-engagement in HIV care (see Appendix B for the three searches as implemented in MEDLINE [OVID] with any restrictions applied). Other searches are available from the corresponding author.

The search of the PRS database for this review consisted of two separate queries, (1) a title, abstract, and keyword search using MH terms (e.g., bipolar, depression, mental disorder, mood states, posttraumatic stress disorder, psychotic disorder) (see Appendix C for the full list of MH terms); and (2) a search of citations coded with an indexing term for linkage or retention in HIV care (Appendix C). The two queries were initially conducted in July 2015 (search period: January 2002–July 2015) and were repeated in March 2016 and August

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2017. Additionally, a separate hand-search was conducted to identify articles in non-HIV–related literature that might have been missing in the PRS database including checking the reference lists of included citations (Appendix D).

Inclusion Criteria

Studies were included in the review if they (1) were conducted in the United States; (2) assessed persons with HIV; (3) contained a measurement of MH status and a measure of retention in HIV care; (4) measured any of the following MH variables: *Diagnostic and Statistical Manual of Mental Disorders* (DSM) psychiatric diagnosis (American Psychiatric Association, 2013), MH-related symptoms, or MHSU (e.g., visit to a health professional for MH treatment or psychological counseling); (5) included children, adolescents, or adults with diagnosed HIV/AIDS; and (6) assessed MH symptoms or diagnosed MH disorders by self-report measures, interviews, or medical record abstraction. This review examined the entire range of MH diagnoses and symptoms that PLWH can experience by including the full continuum of MH diagnoses and symptoms that might affect retention in HIV care.

This review exclusively focused on MH diagnoses or symptoms and excluded studies that only reported a measure of substance abuse and did not assess MH status. Additionally, to ensure that the association between MH and retention in HIV care was not confounded by any ongoing HIV− or mental health–related interventions, intervention reports were excluded. Lastly, studies whose target population was an HIV provider or caregiver were excluded because PLWH were the target population for this review.

Data Abstraction and Quality Assessment

Citations and full articles from the search were reviewed by a varying combination of two independent reviewers from a pool of 4 authors (RR, MW, AA, CP) at the title and abstract level, followed by each full text by using DistillerSR v.2 (Evidence Partners, Ottawa, Canada) (Evidence Partners, 2016). Data were abstracted from each paper that met the inclusion criteria by using standardized forms developed by study staff (MW, AA). Information abstracted included study characteristics (i.e., study location, study design, target population, and inclusion criteria), sample characteristics (i.e., analytic sample size, age, sex, race/ethnicity, sexual orientation, substance use status, and health insurance status), MH variable information (i.e., type of MH diagnosis or symptoms, MH measurement tool, type of MH service, and provider type), retention outcome, and study quality. Effect estimates were abstracted that assessed the association between MH diagnoses or symptoms or MHSU as the exposure variable and retention in HIV care as the outcome variable. Additionally, adjusted effect sizes that accounted for potential confounders were abstracted for analysis when available.

Study quality was evaluated by using the National Heart, Lung, and Blood Institute (NHLBI) quality-assessment tool for observational cohort and cross-sectional studies (National Heart Lung Blood Institute, 2014). Responses to each of the 13 items included “Yes,” “No,” “Not Applicable,” or “Not Reported.” Items with a “No” response were considered a limitation of the study. We removed a single question from the NHLBI tool on sample power description, since it did not apply to the included studies. Citations were given

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an overall quality rating of “Good,” “Fair,” or “Poor,” based on a priori criteria. Prospective and retrospective cohort studies that assessed the MH variable before measuring the outcome with sufficient time between measurements and controlled for confounders were scored as “good.” Cross-sectional studies were categorized as “fair.” Cross-sectional and retrospective studies that failed to account for confounders and did not describe the exposure or outcome variable were categorized as “poor.” Responses were reconciled to resolve mismatches.

Publication bias was assessed by visual inspection of funnel plot asymmetry (Egger, Davey Smith, Schneider, & Minder, 1997) and validated by Begg and Mazumdar rank correlation (Begg & Mazumdar, 1994). Additionally, the random effects fail-safe N was estimated to determine what number of missing studies would be required to nullify the overall mean effect estimate (Rosenberg, 2005).

Outcome Variables

The primary outcome of interest was retention in primary HIV care. Retention in care was defined as continuity in HIV care appointments over a duration of time (Mugavero et al., 2012) and is operationalized as multiple, completed outpatient HIV care visits with a health care professional. Retention in HIV care include gaps in care (e.g., discontinuities in care), visit constancy (e.g., consecutive time intervals with one or more kept medical appointments), and appointment adherence (e.g., percentage of appointments attended or missed out of the number scheduled).

Data Analysis

Effect sizes were converted to log odds ratios (ORs), weighted by the inverse variance, and then aggregated by using a random effects model (Hedges & Olkin, 2014). Effect sizes were then converted back to an OR for interpretation. Effect sizes that were reported in the opposite direction (association between MH and poor retention in care) were transformed so that an OR ≥1.0 indicated an improvement in retention in HIV care and a value <1.0 was indicative of a lower odds of retention in HIV care. The summary effect estimate, reported as an OR, was calculated by using Comprehensive Meta-Analysis v.2 (Biostat, Englewood, New Jersey) (Borenstein, Hedges, Higgins, & Rothstein, 2005). The likelihood of heterogeneity across studies was determined by the Q statistic, and the percentage of variability caused by heterogeneity was calculated by I^2 (Higgins, Thompson, Deeks, & Altman, 2003). I^2 values of 25%, 50%, and 75% were categorized as low, medium, and high heterogeneity, respectively.

A moderator analysis was then conducted by examining whether factors identified *a priori* might modify the effect estimate or explain any heterogeneity included: age (mean age), sex (percentage male), race/ethnicity (percentage black race), sexual orientation (percentage men who have sex with men [MSM]), substance abuse status (percentage currently or within the previous year using illegal substances), health insurance status (percentage receiving public health insurance), education status (percentage with a high school education or less), type of MH diagnosis or symptoms (depression diagnosis or symptoms versus other MH diagnosis or symptoms), measurement of MH status (MH clinical diagnosis versus self-

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reported symptoms), assessment period for retention in HIV care, retention in care measurement, and study design (prospective cohort, cross-sectional, or retrospective). Studies that did not report a specific population or study level characteristic were not included in the respective moderator analysis. Meta-regression was used to assess how continuous population level variables modify the overall effect estimate. Mixed model analysis was used to assess between group (Q_B) differences in dichotomous or categorical study level variables.

Studies that examined the association between more than one form of a MH diagnosis or symptoms (e.g., both depression and posttraumatic stress disorder [PTSD]) and retention in care outcome contributed multiple effect estimates to the overall summary effect. A sensitivity analysis was conducted to determine whether including multiple dependent effects from a single study substantially changed the overall results. The analysis was repeated with only one effect per study by using a pooled MH outcome (e.g., psychosis, psychiatric diagnoses, or mood disorders). If no pooled MH outcome variable was reported, the association between depression and retention in care was used as the single effect size, because depression was the most commonly assessed MH outcome. Only one effect size was included for studies that examined MHSU and retention in care.

Results

After de-duplication, a total of 5,827 studies were identified that were published during 2002–2017. No relevant articles were identified in any of the hand-searched non-HIV–related journals. A total of 5,354 articles were excluded at title and abstract level, and 428 articles were excluded after full text review. After excluding irrelevant studies, 45 studies, involving approximately 57,334 participants in total, met the inclusion criteria (Figure 1). Data were abstracted from the included studies and analyzed (Appendix E). A total of 39 (52 effects) studies reported on MH diagnoses or symptoms, and 14 (12 effects) studies reported on MHSU.

Mental Health Diagnoses or Symptoms and Retention in HIV Care

Characteristics of Included Studies—Thirty-nine studies examined the association between MH diagnoses or symptoms and retention in HIV care. Among those studies, 16 were prospective (Aidala, Lee, Abramson, Messeri, & Siegler, 2007; Ashman et al., 2002; Buchberg et al., 2015; Byrd et al., 2015; Dang, Westbrook, Hartman, & Giordano, 2016; Dietz et al., 2010; Jacks et al., 2015; Kushel et al., 2006; Mellins, Kang, Leu, Havens, & Chesney, 2003; Merlin et al., 2012; Minniear et al., 2013; Outlaw et al., 2010; Schumacher et al., 2013; Traeger, O'Cleirigh, Skeer, Mayer, & Safren, 2012; Waddell & Messeri, 2006; Zuniga, Yoo-Jeong, Dai, Guo, & Waldrop-Valverde, 2016); 13 were cross-sectional (Conover & Whetten-Goldstein, 2002; Du Bois & McKirnan, 2012; Gardner et al., 2002; Hightow-Weidman et al., 2017; Hussen, Harper, Bauermeister, Hightow-Weidman, & Adolescent Medicine Trials Network for HIV/AIDS Interventions, 2015; Leserman et al., 2005; Meade, Hansen, Kochman, & Sikkema, 2009; Saint-Jean et al., 2011; Schafer et al., 2012; Siddiqui, Bell, Sangi-Haghpeykar, Minard, & Levison, 2014; Tobias et al., 2007; van Servellen, Chang, Garcia, & Lombardi, 2002; Wohl et al., 2011); and ten were retrospective (Bofill, Waldrop-Valverde, Metsch, Pereyra, & Kolber, 2011; Colasanti, Stahl, Farber, Del

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Rio, & Armstrong, 2017; Giordano, Hartman, Gifford, Backus, & Morgan, 2009; Jones, Cook, Rodriguez, & Waldrop-Valverde, 2013; Rana, Gillani, Flanigan, Nash, & Beckwith, 2010; Rana et al., 2015; Rao et al., 2013; Ulett et al., 2009; Wawrzyniak et al., 2015; Yehia et al., 2015). The most common MH variables examined were depression (21 studies), followed by any psychiatric disorder (12 studies), and stress (eight studies) (Table 1). Various methods were used to measure retention in care, including visit constancy (eight studies), kept visits (21 studies), no-show rates (five studies), and gaps in care (two studies). The majority of studies were conducted with adults (31 studies); four studies included youth aged 12–24 years; three studies targeted males; and five targeted females. Further, more studies were conducted in the U.S. South (15 studies) than other U.S. regions, and three studies provided data from a nationally representative sample.

Meta-Analysis—Of the 39 studies that reported on MH diagnoses or symptoms, 35 studies (52 effects) reported an effect size that could be summarized. Overall, a significant association existed between MH diagnoses or symptoms and retention in HIV care (OR = 0.94; 95% CI = 0.90–0.99) ($Z = -2.58$; $p = 0.01$) (Figure 2). The effect was heterogeneous ($Q_{46} = 181.6$; $p < 0.001$; $I^2 = 71.9\%$). When the data were stratified on the basis of type of MH diagnoses or symptoms depression was significantly related to retention in HIV care (OR = 0.88; 95% CI = 0.80–0.97), whereas other diagnosis categories were not significantly related (Table 1). There was no statistically significant difference in the size of the relationship among types of mental health diagnoses or symptoms and retention in care ($Q_B = 7.86$; $p = 0.35$).

Four studies (Du Bois & McKirnan, 2012; Hussen et al., 2015; Rana et al., 2010; van Servellen et al., 2002) did not provide an effect size that could be summarized and were qualitatively synthesized. Three of these four studies (Du Bois & McKirnan, 2012; Hussen et al., 2015; Rana et al., 2010) reported non-significant findings regarding the association between MH diagnoses or symptoms and retention in HIV care, but those studies did not provide an effect size or the direction of the effect. One study (van Servellen et al., 2002) examined anxiety and depression symptoms by using the Hospital Anxiety and Depression Scale (Zigmond & Snaith, 1983). Van Servellen et al. (2002) reported that persons not retained in HIV care, determined by clinical chart review, had a mean depression score within the normal range and a mean anxiety score in the borderline clinical range.

Moderator Analysis—Subgroup analysis and meta-regression were performed to determine whether the association between MH diagnoses or symptoms and retention in HIV care were modified by population- or study-level characteristics (Table 2). Age, sex, race/ethnicity, sexual orientation, substance abuse status, education, measurement of MH status, and type of MH diagnosis did not significantly modify the overall effect estimate. Public health insurance status ($\beta = 0.004$; $Z = 3.47$; $p = 0.001$) significantly modified the association between MH diagnoses or symptoms and retention in HIV care. In the subgroup analysis, no significant differences in the effect estimates were observed when effects were stratified by study design, mental health measurement, study quality, retention assessment period, or retention in care measurement.

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Sensitivity Analysis and Publication Bias—Eleven studies (Dietz et al., 2010; Hightow-Weidman et al., 2017; Kushel et al., 2006; Meade et al., 2009; Mellins et al., 2003; Outlaw et al., 2010; Rao et al., 2013; Saint-Jean et al., 2011; Schafer et al., 2012; Traeger et al., 2012; Yehia et al., 2015) contributed multiple effect estimates to the summary effect. Sensitivity analysis was first conducted by including only one MH variable effect per study; the association between MH diagnoses or symptoms and retention in HIV care remained significant (OR = 0.95; 95% CI = 0.90–0.99; $p = 0.03$). A second sensitivity analysis was conducted to determine the impact of removal of one study at a time from the summary effect estimate; the overall effect estimate remained similar and significant, except for removal of one study (OR = 0.96; 95% CI = 0.92–1.00; $p = 0.06$) (Ashman et al., 2002). Ashman et al. (2002) had the largest sample size, compared with all other studies. No evidence was identified of publication bias, on the basis of visual inspection of the funnel plot and Begg test ($Z = 0.02$; $p = 0.99$). The fail-safe N was 135.

MHSU and Retention in HIV Care

Characteristics of Included Studies—Fourteen studies examined the association between MHSU and retention in HIV care. Among the included studies six were prospective studies (Aidala et al., 2007; Ashman et al., 2002; Magnus, Schmidt, Brown, & Kissinger, 2002; Messeri, Abramson, Aidala, Lee, & Lee, 2002; Naar-King et al., 2007; Waddell & Messeri, 2006); six were cross-sectional studies (Colasanti et al., 2017; Conover & Whetten-Goldstein, 2002; Lo, MacGovern, & Bradford, 2002; Meade et al., 2009; Mitchell et al., 2017; Tobias et al., 2007); and two were retrospective cohort studies (Rao et al., 2013; Sherer et al., 2002). MHSU was accessed through ancillary services in nine studies and through outpatient services in four. Retention was assessed by visit constancy (six studies), kept visits (seven studies), and gaps in care (one study). The majority of studies included adults (nine studies); three studies included youth; and two studies provided data from a nationally representative sample. Six studies examining MHSU were located in the Northeast; three were conducted in the South; and three were conducted in the Midwest.

Meta-Analysis—Overall, a significant association existed between MHSU and retention in HIV care (OR = 1.84; 95% CI = 1.45–2.33) ($Z = 5.05$; $p < 0.001$) (Figure 3). The Q test and I^2 indicated heterogeneity among studies that assessed the association between MHSU and retention in HIV care ($Q_{10} = 72.3$; $p < 0.001$; $I^2 = 84.8$ %).

Two additional studies (Messeri et al., 2002; Naar-King et al., 2007) did not provide an effect size that could be summarized and were qualitatively synthesized. Naar-King et al. (2007) reported that the provision of counseling services was significantly associated with fewer gaps in retention in HIV care. Similarly, Messeri et al. (2002) determined that MHSU improved retention in HIV care (OR = 1.5), although the association was not statistically significant.

Moderator Analysis—Subgroup analysis and meta-regression were performed to determine whether the association between MHSU and retention in HIV care were modified by population- or study-level characteristics (Table 2). Age, sex, race, sexual orientation, substance abuse status, education, and health insurance status did not significantly modify

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the association between MHSU and retention in HIV care. In the subgroup analysis, no significant differences existed in the overall effect estimate when effects were stratified by study design or retention assessment period.

Sensitivity Analysis and Publication Bias—A sensitivity analysis was conducted by first removing outlying effects (Magnus et al., 2002; Meade et al., 2009). Magnus et al. (2002) was the only study conducted among young children (newborn–age 13 years); it assessed MHSU and retention in HIV care by using data obtained regarding children aged ≥1 year from pediatric medical databases. Meade et al. (2009) assessed baseline data collected as part of a clinical trial of a group-coping intervention for HIV-positive adults who had experienced sexual abuse before age 18 years. The majority of participants (99%) in the Meade et al. study were enrolled in HIV medical treatment. After the two effects (Magnus et al., 2002; Meade et al., 2009) were removed, the effect size decreased slightly but remained statistically significant (OR = 1.61; 95% CI = 1.38–1.87) ($Z = 6.22$; $p < 0.001$). Additionally, the heterogeneity statistic decreased ($Q_{10} = 22.7$; $p = 0.007$; $I^2 = 60.3\%$) but remained >50%. Secondly, a sensitivity analysis was conducted by removal of one study, which did not significantly change the effect estimate examining MHSU and retention in HIV care. The effect estimates changed slightly and ranged from OR = 1.62 (95% CI = 1.39–1.90) to OR = 1.91 (95% CI = 1.51–2.42). Removal of studies with a smaller sample size (Magnus et al., 2002; Meade et al., 2009) resulted in a smaller overall effect estimate, and removal of larger studies resulted in a larger overall effect estimate. No evidence of publication bias was detected on the basis of visual inspection of the funnel plot and Begg test ($z = 0.55$; $p = 0.58$). Fail-safe N was 480.

Quality Assessment

The quality scores for each study are provided in Appendix F. The most common limitations among studies were exposure being assessed before the outcome measurement; lack of a sufficient time frame to measure an effect; and repeated exposure of assessment. Sample size justification and blinding of the outcome measurement were not determined to apply to the majority of the included studies. Similarly, because the majority of studies were cross-sectional or retrospective, loss to follow-up was also not applicable. Overall, we determined that the quality of evidence was fair because the majority of studies were cross-sectional or retrospective cohort design that did not account for confounders. In the subgroup analysis for MH diagnoses or symptoms and retention in HIV care (Table 2), studies that were rated poor had a larger effect estimate, compared with good and fair studies. However, study quality was not statistically significantly different across levels ($Q_B = 4.55$; $p = 0.10$).

Discussion

The results of this study demonstrate that having MH diagnoses or symptoms is statistically significantly associated with lower odds of being retained in HIV care and are consistent with multiple quantitative and qualitative primary studies (Holtzman, Shea, et al., 2015; Sprague & Simon, 2014) that report poor MH is a salient barrier to retention in care. The present study attempted to examine specific types of MH diagnoses or symptoms and identify statistically significant modifiers of the association between MH and retention in care. Unfortunately, few studies reported on specific MH diagnoses or symptoms (e.g.,

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anxiety or bipolar disorder) other than depression. However, depression was identified as statistically related to lower odds of being retained in HIV care. Although MH diagnoses or symptoms were a barrier to retention in HIV care, these results also reveal that increased MHSU was associated with higher odds of being retained in HIV care. The clinical implications of this study are that persons with HIV who are treated for their MH diagnoses or symptoms might have better HIV clinical outcomes than those whose MH diagnoses or symptoms remain untreated. Current HIV prevention strategies, such as 'test-and-treat' (Cambiano, Rodger, & Phillips, 2011; Cohen et al., 2016) and 'treatment as prevention' (Centers for Disease Control and Prevention, 2017a), emphasize ART medication as key components. The results of this study suggest that the clinical treatment of HIV may need also to address mental health for patients to achieve optimal HIV outcomes, including retention in care. If persons living with HIV are retained in care, they more likely to be virally suppressed (Centers for Disease Control and Prevention, 2017c).

Use of ancillary services (e.g., MH treatment) has been previously reported to improve retention in HIV care by addressing the complex health care needs of persons who have multiple diagnoses (Conover & Whetten-Goldstein, 2002). This is the first systematic review to quantitatively examine the association between MHSU and retention in HIV care. The results of this review examining correlational studies demonstrated a larger association between MHSU and retention in HIV care than reports of intervention studies examining MH interventions (e.g., cognitive behavior therapy or motivational interviewing) (Crepaz et al., 2008; Mbuagbaw, Ye, & Thabane, 2012). Previous studies have demonstrated that the benefits of MHSU in PLWH include improvements in $CD4^+$ count and mortality outcomes (Blashill, Perry, & Safren, 2011). Recent evidence indicates the need for MH services continues to be unmet (DeGroote, Korhonen, Shouse, Valleroy, & Bradley, 2016; Korhonen et al., 2016), and in the case of HIV care, this can affect retention. Thus, more methods are needed for improving retention in HIV care among these populations, including provision of access to and support for MH services.

A small, negative association was observed between MH diagnoses and symptoms and retention in HIV care. Sensitivity analysis revealed that the association was no longer statistically significant after removing one study (Ashman et al., 2002) that had a larger effect size and the largest population of all included studies. However, the effect estimate remained fairly stable thus did not change the interpretation of the results. Multiple studies have demonstrated that patients with a MH diagnosis who are receiving MH care are 10%–40% more likely to be retained in HIV care, compared with patients whose need for MH services remains unmet (Himelhoch, Brown, et al., 2009; Himelhoch, Josephs, et al., 2009; Meade et al., 2009; Sherer et al., 2002; Weiser et al., 2006). Therefore, the small negative association between having MH diagnoses or symptoms and retention in HIV care might have been larger if the populations studied only included patients not receiving any MH services. The patients in the included studies who were suffering from MH diagnoses in this review might have received other ancillary services (e.g., substance abuse treatment) that are also likely to improve retention in HIV care (Lucas et al., 2010). Future research examining the association between MH diagnoses or symptoms and retention in HIV care can explore this association by accounting for MHSU.

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In the moderator analysis, public health insurance was determined to modify the association between MH diagnoses or symptoms and retention in HIV care. Studies with a lower proportion of participants with public health insurance had lower rates of retention in HIV care, compared with studies with a higher percentage of public health–insured persons. Moreover, one study (Byrd et al., 2015) that examined only Medicaid-insured participants reported that 61% of the population was retained in HIV care and a MH diagnosis was related to fewer gaps in HIV care. The higher odds of being retained in care among publically insured populations with a MH diagnosis might be attributable to their ability to receive more follow-up, compared with uninsured populations. In addition to health insurance, study design was identified as a substantial moderator in that prospective studies observed a larger effect estimate, compared with retrospective and cross-sectional studies. When assessing the long-term effects of a MH diagnoses or symptoms on retention in HIV care, prospective study designs are able to assess this association temporally. Because retention is defined as extending over a period, examination of variables affecting retention in care longitudinally is needed (Horstmann et al., 2010). Lastly, in the stratified analysis, no difference in effect size occurred when comparing studies that measured MH status by using diagnostic interview versus self-report assessments, which indicates that the association between retention in HIV care and MH is similar, regardless if it is a MH diagnosis or self-reported symptom. Furthermore, it might also indicate that self-reported assessment of MH symptoms with valid tools might be as useful as clinician assessments in identifying those in need of MH services while in HIV care.

This review had certain limitations. First, serious mental illness (e.g., schizophrenia or bipolar disorder) was not well-represented in the included studies; therefore, the results are not generalizable to all MH conditions. Further, the moderator analysis did not identify any factors that substantially reduced the heterogeneity. Therefore, other unidentified factors might account for the variation in the overall effect estimate. Few studies reported on a specific MH diagnoses other than depression, and the non-significant association between other types of MH diagnoses and retention may be due to lack of power. Moreover, the lack of power made it difficult to detect significant differences in the size of the relationship between retention and other types of mental health diagnoses or symptoms. Additionally, few studies reported subgroup data; therefore, this review was limited in assessing the association of MH and retention in HIV care across different populations and settings.

This review identified gaps in the literature, which limits generalizability to certain populations. Multiple studies examined black populations primarily; however, few studies examined other minority populations (e.g., Latinos or Hispanics). In addition, few studies specified the type of MH professionals providing the services, and only three studies were conducted in rural settings. Furthermore, although youth living with HIV suffer from high rates of mental illness (Mellins et al., 2009), few studies reported on that population. This review, however, did not find an effect of age on the association between MH diagnoses or symptoms or MHSU and retention in HIV care. Future research examining effects of MH on retention in HIV care and the benefit of MHSU on retention is needed among various MH diagnoses (e.g., generalized anxiety or bipolar disorder) and among specific populations (e.g., youth, Latinos, or Hispanics). Also needed are studies in rural settings and among different types of MH service deliverer (e.g., psychologist or social worker) because the

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associations might differ on the basis of these factors. Lastly, studies among general populations can provide stratified analyses to understand differences in association among certain subgroups.

Conclusion

The results of our study indicate that depression is statistically related to retention in care and that other types of MH diagnoses or symptoms need further examination (e.g., anxiety, bipolar disorder, and PTSD) in PLWH. To our knowledge, this is first meta-analysis to specifically identify public health insurance as a significant moderator of the association between mental health and retention in care. Although the effect of MH on retention in care was limited, few studies accounted for whether persons were concurrently receiving MH services. Future studies that investigate the role MH plays on retaining populations whose need for MH services remain unmet (i.e., have underutilization of MH services) will aid in identifying the importance of MH care for HIV outcomes. Moreover, results of this study demonstrate the need for addressing barriers to MH treatment in interventions focused on improving retention in care because mental health treatment is a strong facilitator of retention in HIV care.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

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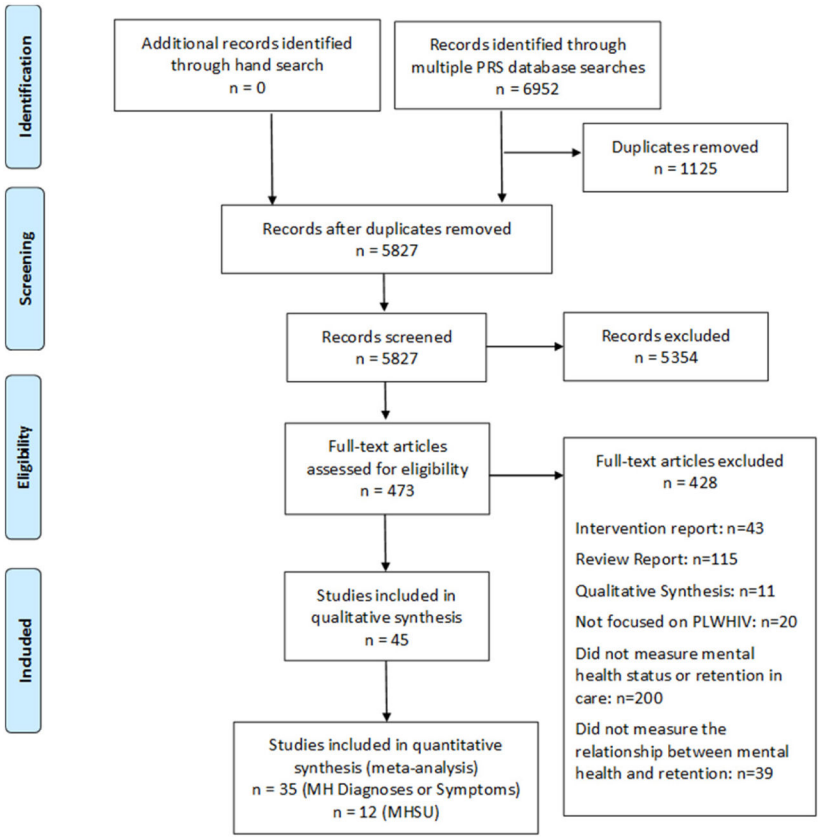

Figure 1.
Flow diagram of the study selection process.

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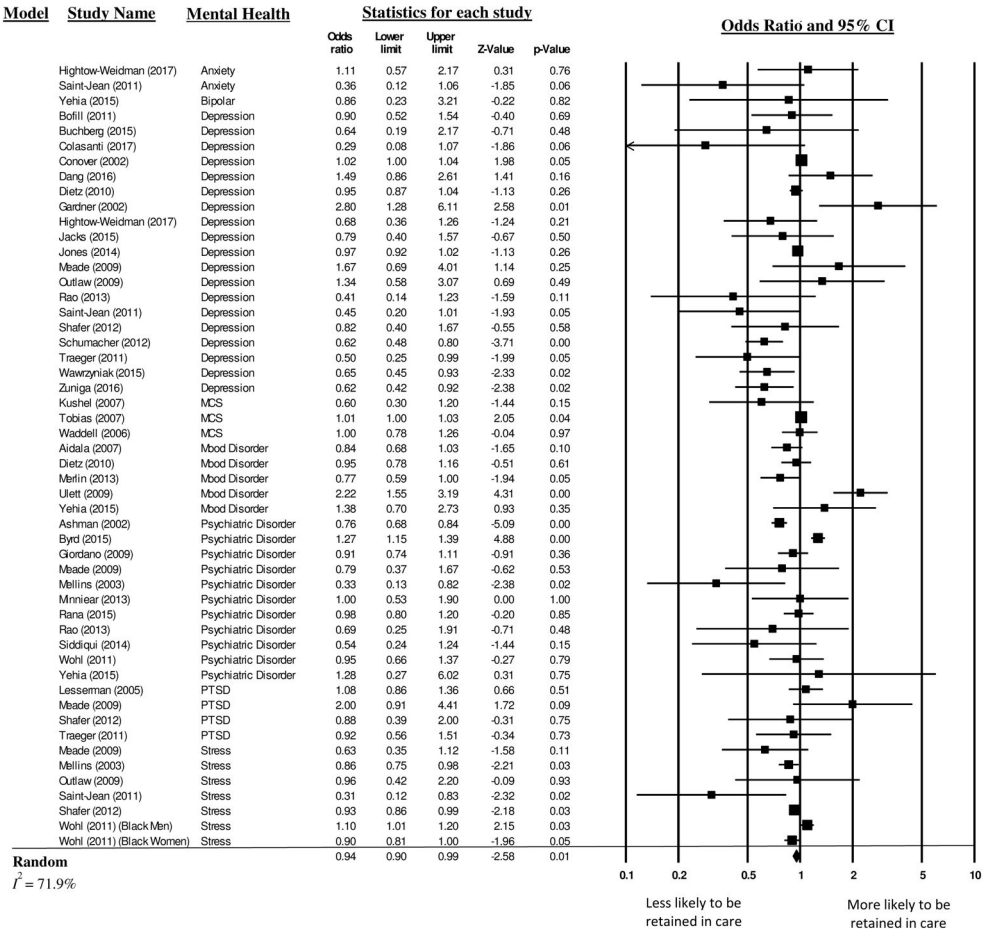

Figure 2.

Forest plot for the random effects meta-analysis examining the association between mental health diagnosis or symptoms and retention in HIV care. Effects are categorized by mental health variable type.

CI: Confidence Interval; PTSD: Posttraumatic stress disorder; MCS: Mental health composite score

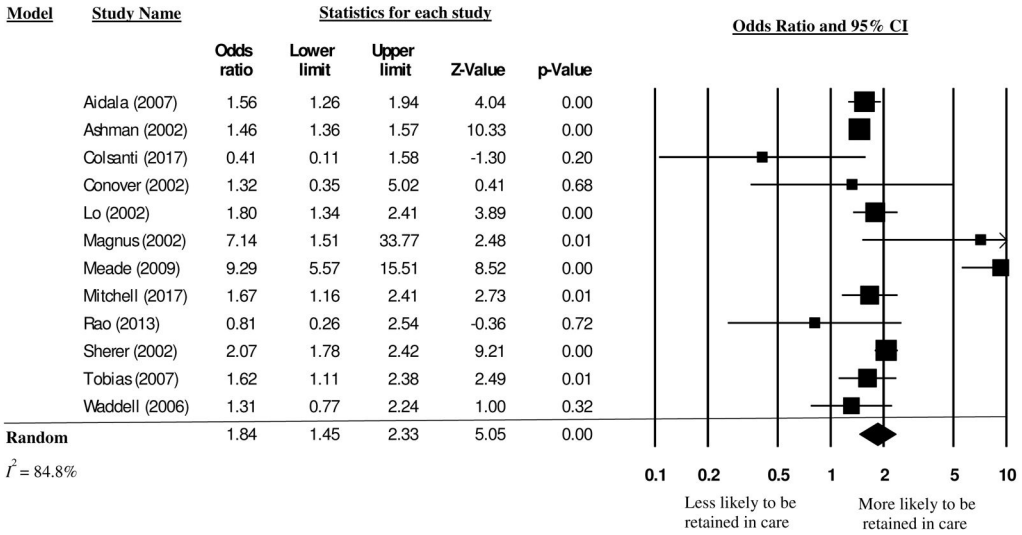

Figure 3.

Forest plot for the random effects meta-analysis examining the association between mental health service usage and retention in HIV care.

CI: Confidence Interval

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Table 1

Meta-Analysis Examining the Association Between Mental Health Diagnosis or Symptoms and Retention in HIV Care (35 Studies), Stratified by Mental Health Type

Variable	Effects (k)	Odds ratio	95% CI	*p*-value	I^2 (%)
Mental health variable					
Anxiety	2	0.69	0.23–2.05	0.50	66.9
Bipolar	1	0.86	0.23–3.21	0.82	NA
Depression	19	0.88	0.80–0.97	0.01	68.9
Mood disorder	5	1.09	0.78–1.51	0.61	84.6
Mental health composite score	3	1.01	0.94–1.08	0.86	10.1
Psychiatric disorder	11	0.88	0.71–1.09	0.25	83.1
Posttraumatic stress disorder	4	1.08	0.89–1.31	0.44	0.0
Stress	7	0.92	0.82–1.03	0.15	72.0
Overall	52	0.94	0.90–0.99	0.01	71.9

CI = confidence interval.

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Table 2

Association Between Mental Health Diagnosis or Symptoms (35 Studies) or Mental Health Service Utilization (12 Studies) and Retention in Care Across Groups, Including Meta-Regression and Stratified Analysis Presented for Each Population and Study-Level Characteristic

	Mental health diagnosis or symptoms						Mental health service utilization				
Population characteristic	**No. of studies**	**Effects (k)**	**β-coefficient**	**Standard error**	***Z*-value**	***p*-value**	**Effects (k)**	**β-coefficient**	**Standard error**	***Z*-value**	***p*-value**
					Meta-regression analysis						
Mean age	24	35	−0.007	0.004	−1.57	0.12	8	−0.02	0.06	−0.31	0.75
Percentage male	35	52	0.0002	0.001	0.27	0.79	12	−0.02	0.009	−1.80	0.07
Percentage black	32	49	0.001	0.001	1.08	0.28	12	0.004	0.006	0.66	0.51
Percentage MSM	16	25	0.001	0.001	0.50	0.62	7	0.005	0.01	0.55	0.58
Percentage using illegal substances	28	44	−0.0003	0.001	−0.22	0.83	11	−0.005	0.006	−0.85	0.40
Percentage with high school education or less	19	32	−0.003	0.002	−1.53	0.12	7	0.005	0.01	0.37	0.71
Percentage on public health insurance	17	26	0.004	0.001	3.47	0.001*	9	0.01	0.01	1.28	0.20

	Mental health diagnosis or symptoms							Mental health service utilization					
	No. in study	**Effects (k)**	**Odds ratio**	**95% CI**	I^2	Q_B	***p*-value**	**Effects (k)**	**Odds ratio**	**95% CI**	I^2	Q_B	***p*-value**
						Random effects meta-analysis and stratified analysis							
Overall	**35**	**52**	**0.94**	**0.90–0.99**	**71.9**	—	—	**12**	**1.84**	**1.45–2.33**	**84.8**		
Mental health variable						1.57	0.21					—	—
Depression	19	19	0.88	0.80–0.97	68.9			—	—	—	—	—	—
Other mental health diagnosis or symptoms	24	33	0.95	0.89–1.02	74.1			—	—	—	—	—	—
Mental health measurement						0.54	0.46					—	—
Diagnostic - interview	14	18	0.89	0.74–1.08	82.7			—	—	—	—	—	—
Self-report	23	34	0.96	0.92–1.00	59.6			—	—	—	—	—	—
Study quality						4.55	0.10					2.33	0.31
Good	14	18	0.98	0.88–1.10	74.5			3	1.65	1.05–2.60	51.0		
Fair	19	31	0.93	0.88–0.97	72.7			8	1.97	1.45–2.67	89.5		
Poor	2	3	0.55	0.31–0.95	0			1	0.81	0.26–2.54	NA		
Study design						4.82	0.09					0.72	0.70
Prospective	15	20	0.86	0.76–0.97	78.2			4	1.50	1.29–1.75	32.9		
Cross-sectional	11	20	0.99	0.95–1.04	59.2			6	1.96	1.07–3.58	88.3		

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	Mental health diagnosis or symptoms							Mental health service utilization					
	No. in study	Effects (k)	Odds ratio	95% CI	I^2	Q_B	*p*-value	Effects (k)	Odds ratio	95% CI	I^2	Q_B	*p*-value
Retrospective	9	12	0.98	0.81–1.17	66.1			2	1.55	0.66–3.63	60.7		
Retention Assessment Period						7.77	0.17					4.20	0.52
≥1 visit/6 mos.	4	7	1.14	0.80–1.61	57.7			3	2.89	1.07–7.82	94.2		
≥2 visits/6 mos.	6	9	0.91	0.82–1.01	75.7			1	1.56	1.26–1.94	NA		
≥2 visits/12 mos.	12	17	0.96	0.89–1.03	27.7			4	1.41	0.83–2.40	63.1		
≥3 visits/12 mos.	4	7	0.91	0.85–0.97	0			1	0.81	0.26–2.54	NA		
≥4 visits/12 mos.	6	9	0.72	0.56–0.94	40.7			2	2.88	0.80–10.37	65.8		
≥4 visits/24 mos.	3	3	1.25	0.79–1.98	97.0			1	1.46	1.36–1.57	NA		
Retention in Care Measurement						2.76	0.43					1.19	0.27
Kept Visits	17	27	0.93	0.88–0.98	73.5			7	2.04	1.44–2.88	90.6		
Visit Constancy	11	15	0.94	0.81–1.10	70.7			5	1.57	1.14–2.15	53.6		
Gap in care	2	2	1.13	0.88–1.45	80.7			—	—	—	—		
No-show rates	5	8	0.91	0.86–0.97	0			—	—	—	—		

Mos.: months; Q_B = between groups effect; k = number of effects; MSM = men who have sex with men.

The number of effects (k) for mental health service utilization is equal to the number of studies.

* $p \leq 0.05$