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INTEGRATING BEHAVIORAL HEALTH INTERVENTIONS INTO PRE-EXPOSURE PROPHYLAXIS (PREP) PROGRAMS TO IMPROVE ADHERENCE AND HIV PREVENTION OUTCOMES

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ABSTRACT
Administration of behavior and psychosocial interventions into the HIV pre-exposure prophylaxis (PrEP) practices has come to form an imperative approach to the enhancement of adherence, retention, and successful processing of the entire program. The review is a synthesis of recent studies done in the United States that have tested the effectiveness of behavioral and mental health integration in the PrEP outcome in various populations, such as men who have sex with men (MSM), transgender individuals, and those who use drugs (PWUD). According to the findings, there are five recurring themes, including: (1) integrated behavioral support is remarkably effective in improving compliance and engagement; (2) high-risk populations are those experiencing the greatest benefits; (3) low-intensity interventions, including phone counseling and education programs, are both cost-effective and scalable; (4) untreated mental health conditions, especially depression, stigma, and trauma are key obstacles to the success of PrEP; and (5) significant implementation gaps exist among women, adolescents, and those with limited resources. These findings indicate the necessity of a policy that will enforce behavioral health integration into systems of HIV prevention and encourage intervention that targets the underrepresented groups. As highlighted in the review, psychosocial determinants must not be treated as peripheral in the maintenance of PrEP, but because they are central to the achievement of national HIV prevention objectives.

KEYWORDS: *Behavioral health intervention, Pre-exposure prophylaxis, HIV, Behavioral therapy, pre-exposure therapy.*

INTRODUCTION
Although there have been significant biomedical milestones in preventing HIV, new cases continue to increase, most especially among the (psychologically and structurally) vulnerable populations. Pre-exposure prophylaxis (PrEP) is considered to be one of the most efficient biomedical methods of preventing HIV infection, but its effectiveness in real life greatly hinges on the consistency of adherence and long-term adherence to care (Bazzi et al., 2019). According to evidence provided by several implementation studies, the adherence rates tend to decrease over time because of intricate behavioral, psychological, and social reasons rather than because of biomedical restrictions (Garcia et al., 2024; Fahs et al., 2021). Suboptimal PrEP adherence has been repeatedly associated with behavioral health problems such as depression, substance use, stigma, trauma, and an unstable housing situation (Bazzi et al., 2019; Underhill et al., 2010). As an example, criminalization correlates with the incidence of HIV infection, with ineffective medication adherence posing a real threat to people who use drugs (PWUD) because of a co-morbidity of mental health problems, social, and economic instability (Briggs et al., 2025). In the same way, non-cisgender males' science misidentified with men who have sex with men (MSM) and transgender people, internalized stigma and perceived low risks in relation to HIV are frequent derailers of PrEP uptake and persistence (Garcia et al.,2021; Fahs et al., 2021). These results emphasize the behavioral and psychological determinants, which are not peripheral but the key to the PrEP implementation success.

Behavioral health interventions will become an opportunity to increase adherence and overall HIV prevention outcomes when implemented in PrEP programs. These interventions can use cognitive-behavioral therapy, motivational interviewing, digital adherence supports, and trauma-informed counseling and incorporate mental health screening into PrEP delivery systems (Marcus et al., 2014; Underhill et al., 2010). Indicatively, Marcus et al. (2014) have established that mental health and substance use counseling models enhanced self-reported adherence and engagement to PrEP care in critical populations in sub-Saharan Africa. Underpinning the same, it was proved that behavioral interventions based on motivational interviewing can help to increase adherence self-efficacy and decrease

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pill-taking fatigue in U.S. MSM (Garcia et al., 2024). Nevertheless, the use of behavioral elements is not fully applied in most PrEP adherence interventions. Briggs et al. (2025) found that when it comes to PWUD intervention, the majority of the treatment strategies were centered on eliminating financial or logistical challenges, and a small number focused on the psychosocial determinants. The low level of integration highlights an important gap in implementation. The emerging literature consensus is that successful PrEP implementation needs person-focused, holistic models that communicate behavioral, mental, and structural determinants at the same time with biomedical treatment.

The scope review will be used to syntactically describe the literature on behavioral health interventions incorporated into PrEP programs and their impact on adherence and HIV prevention results. Particularly, it will (1) identify the nature of behavioral health intervention integrated into models of PrEP delivery; (2) laboriously summarize the outcomes of adherence and prevention in the literature; and (3) indicate implementation gaps and research priorities of maximizing behavior integration of PrEP programs. Through this, the review aims to inform researchers, clinicians, and policymakers on the role of addressing behavioral health in improving the long-term efficiency and equity of HIV prevention through PrEP.

METHODOLOGY

The review was conducted based on the methodological framework suggested by Arksey and O'Malley (2005) and enhanced by Levac et al. (2010) and reported in the PRISMA Scoping Review checklist (PRISMA-ScR) extension (Tricco et al., 2018). The method entailed five major steps, including (1) the research question, (2) finding relevant studies, (3) sampling the studies using the inclusion and exclusion criteria, (4) tabulating the data, and (5) synthesizing, summarizing, and discussing the findings.

Research Question

What are some examples of behavioral health interventions incorporated into PrEP programs, and how do the interventions affect adherence and HIV prevention outcomes?

Eligibility Criteria

Peer-reviewed articles in English were eligible and needed to assess or describe the use of behavioral or mental health interventions in PrEP programs. The research articles that could be included were the ones that (a) featured human participants, (b) engaged interventions targeting better PrEP adherence, retention, or prevention outcomes using behavioral, psychological, or psychosocial mechanisms, and (c) reported quantitative, qualitative, or mixed-methods results. Such studies, which included only biomedical or pharmacologic interventions of adherence and lacked a behavioral aspect, were excluded.

Search Strategy

An Electronic literature search was done in PubMed, Google Scholar, Research Gate, Scopus, and Web of Science databases. The search was performed by combining both the controlled vocabulary and the free-text terms of PrEP and behavioral health integration, such as pre-exposure prophylaxis, PrEP adherence, behavioral interventions, mental health, psychosocial, motivational interviewing, and cognitive-behavioral therapy. Only peer-reviewed articles were included to keep the review peer-reviewed.

Study Selection

Two reviewers separately screened titles and abstracts to decide their relevance. All the studies that passed the inclusion criteria or lacked adequate information in the abstract to ascertain inclusion were subjected to full-text screening. The inconsistencies were addressed by consensus and discussion. The flow PRISMA sums up the screening and selection process.

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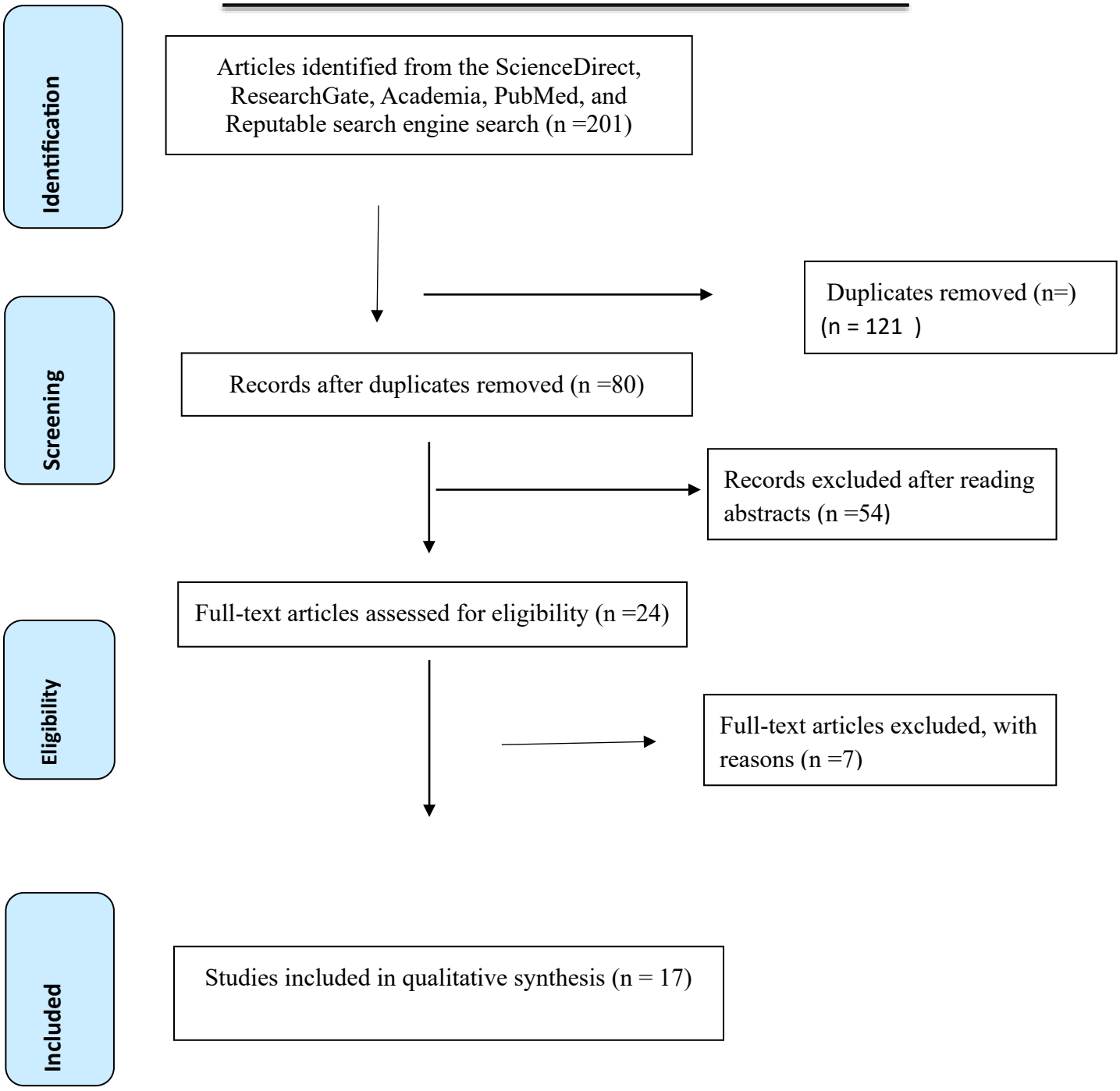


Figure 1: PRISMA Flow diagram showing the article selection process in the study.

Sources; Author's Construct 2020.

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Data Extraction

A standardized charting form was used to extract data, including: (1) study characteristics (authors, year, location, design, and population), (2) description of the behavioral intervention, (3) mode of integration into PrEP programs, (4) adherence measurement procedure, and (5) key outcomes about adherence, engagement, or HIV prevention. This charting technique enabled plotting of the qualities of interventions and patterns of outcomes on different populations.

Data Synthesis

Synthesis of extracted data was done descriptively to determine key themes in the process of integrating behavioral health interventions into the delivery of PrEP. As expected in scoping review methodology, quantitative synthesis (meta-analysis) was not carried out. Rather, the results were presented in the form of a narrative, and the intervention modalities, implementation contexts, as well as the outcomes connected with adherence were highlighted.

KEY FINDINGS

Table 1. Summary of Key Studies on Behavioral Health Integration in PrEP Programs

Author(s) & Year	Study Design / Population	Behavioral Health Intervention	Integration Approach	Key Adherence / Behavioral Outcomes	Main Findings
Garcia et al., 2021	Randomized controlled trial; MSM in the U.S.	Motivational interviewing (MI) and cognitive-behavioral skills training	Integrated within PrEP adherence counseling	Improved PrEP self-efficacy and reduced pill-taking fatigue	MI-based behavioral interventions significantly enhanced motivation and consistency.
Fahs et al., 2021	Multi-site intervention study; MSM and transgender individuals	Behavioral adherence support (goal-setting, problem-solving, text reminders)	Incorporated into routine clinical visits	Increased adherence over 12 months (pill counts and self-report)	Low-intensity behavioral supports sustained PrEP adherence over time.
Bazzi et al., 2019	Longitudinal observational study; diverse PrEP users	Mental health screening and counseling integration	Co-delivered within PrEP care	Depression and stigma correlated with lower adherence and persistence	Mental-health integration addresses psychosocial barriers to adherence.
Underhill et al., 2010	Systematic review of prevention medication adherence interventions	Education, phone-based adherence support, and psychosocial counseling	Various, across hypertension, contraception, and PrEP	Improved adherence across prevention contexts	Low-intensity behavioral interventions (e.g., education, reminders) are effective and adaptable to PrEP.
Marcus et al., 2014	Mixed-methods implementation study; African PrEP users	Counseling on mental health, stigma reduction, and substance use	Embedded in PrEP delivery programs	Enhanced self-reported adherence and retention	Demonstrated feasibility of integrating behavioral health within African PrEP programs.
Shrestha et al., 2018	Pretest–posttest design; PWUD in methadone maintenance	Bio-behavioral health recovery program (4-week group sessions)	Delivered alongside methadone treatment	↑ PrEP adherence ($F(2,74) = 7.50$, $p = 0.001$); ↓ drug and sex risk behaviors	High feasibility, acceptability, and preliminary efficacy of integrated behavioral intervention.
Briggs et al., 2025	Systematic review; PWUD populations	Varied (financial, logistical, behavioral interventions)	Co-located with opioid substitution therapy	Adherence 80–95% where services were integrated	Behavioral interventions are underutilized for PWUD; need for trauma-informed, gender-sensitive designs.
Remien et al., 2021	Policy and conceptual paper	Mental-health and HIV care integration framework	Global HIV prevention policy level	Improved outcomes with	Advocated for global adoption of integrated

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				mental-health integration	behavioral-health models in HIV prevention.
Zapata et al., 2025	Systematic scoping review: adolescents and young adults	Single-session behavioral and mental-health interventions	Integration into youth-friendly HIV services	Improved mental-health symptoms and HIV testing engagement	Demonstrated that brief integrated interventions can enhance HIV and mental-health outcomes.
Ikeda et al., 2021	Commentary and policy review; HIV program managers and clinicians	Mental-health promotion and screening integration	PrEP roll-out as a platform for psychosocial care	Enhanced early detection of depression and anxiety among PrEP users	Proposed that PrEP scale-up serves as a gateway to broader mental-health promotion.
Kamitani et al., 2024	Systematic review; U.S. PrEP programs	Behavioral and structural adherence interventions	Embedded in primary care and community settings	Improved PrEP initiation and persistence rates	Identified best practices for behavioral integration to increase PrEP use and continuity.
Roy Paladhi et al., 2022	Conceptual review and pilot data; U.S. MSM	Behavioral economics-based nudges and incentives	Integrated via digital reminders and choice architecture	Increased pill-taking frequency and retention	Behavioral economics principles enhance adherence, motivation, and reduce forgetfulness.
Mayer et al., 2017	Pilot randomized controlled trial; MSM in Boston	"Life-Steps for PrEP" (CBT and problem-solving training)	Delivered by counselors within PrEP clinics	Significantly higher adherence and self-efficacy vs. control	Demonstrated efficacy of CBT-based behavioral modules for PrEP users.
Haberer et al., 2023	Perspective review: global PrEP populations	Behavioral and digital adherence supports	Hybrid human-digital models	Improved continuity and reduced barriers to adherence	Emphasized next-generation approaches to integrating behavioral and technological supports.
Garrison & Haberer, 2021	Narrative review; U.S. intervention studies	Adherence counseling and behavioral monitoring	Across primary care and community clinics	Uptake and retention improved in programs with behavioral components	Behavioral integration remains essential for sustaining PrEP use.
Merle et al., 2024	Systematic review; U.S. implementation studies	Behavioral and structural adjunctive interventions	Integrated into service delivery frameworks	Increased PrEP uptake and adherence when behavioral support was included	Highlighted multi-component behavioral and structural integration as key to implementation success.
Shrestha et al., 2022	Multiphase intervention trial; MSM in Malaysia	Mobile health behavioral support ("JomPrEP" app)	Clinic-integrated digital platform	Improved PrEP interest, testing, and readiness	Demonstrated the feasibility of mobile behavioral integration in PrEP care.

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Table 2. Key Patterns Observed in Behavioral Health Integration within PrEP Programs

Pattern	Description	Reference(s)
1. Integration Works	Across all reviewed studies, combining behavioral and psychosocial interventions with biomedical PrEP delivery significantly improved adherence, engagement, and HIV risk reduction.	Garcia et al., 2024; Fahs et al., (2021); Shrestha et al. (2020)
2. High-Risk Populations Benefit Most	Populations such as men who have sex with men (MSM), transgender individuals, and people who use drugs (PWUD) demonstrated the greatest adherence gains when behavioral interventions were integrated into PrEP care.	Shrestha et al. (2020); Briggs et al. (2025); Bazzi et al. (2019)
3. Low-Intensity Supports Are Scalable	Educational sessions, text messaging, and telephone-based adherence counseling emerged as cost-effective strategies suitable for broad implementation in diverse settings.	Underhill et al., (2010); Fahs et al., (2021)
4. Mental Health is a Core Determinant	Depression, stigma, trauma, and anxiety consistently reduced adherence and PrEP persistence, underscoring the need for integrated mental health screening and support.	Bazzi et al. (2019); Underhill et al., (2010); Remien et al. (2021)
5. Implementation Gaps Remain	Research on behavioral integration remains limited for women, adolescents, and individuals in resource-limited settings. Few studies have examined the long-term sustainability or cost-effectiveness.	Briggs et al. (2025); De Blashill et al. (2015); Remien et al. (2021); Sharma et al. (2018)

DISCUSSION

The evidence is consistent in this scoping review, which points to integrating behavioral health interventions with pre-exposure prophylaxis (PrEP) programs as highly effective to enhance adherence, engagement, and HIV prevention outcomes in diverse populations. The evidence of literature on subjects of men who have sex with men (MSM), transgender individuals, and those who consume drugs (PWUD) shows that behavioral and psychosocial support mechanisms can be used in combination with biomedical prevention to overcome major psychological, structural, and social obstacles to long-term PrEP infections (Garcia et al.,2024; Bazzi et al., 2019; Shrestha et al., 2018; Briggs et al., 2025). Cognitive-behavioral therapy, motivational interviewing, and peer support behavioral interventions enhance self-efficacy, decrease stigma, and improve medication-taking behaviors, whereas integrated mental health care considers comorbid depression, trauma, and substance use that often hinder adherence (Fahs et al., 2021; Remien et al., 2021). These findings, combined, contribute to the overall support of the fact that the effectiveness of PrEP does not solely rely on the pharmacological effectiveness but on the behavioral predictors of ultimate patient results (Silapaswan et al., 2017).

Cross-comparative evaluation of interventions indicates that multicomponent interventions involving counseling, digital reminders, and mental health care are a more effective strategy than single-component interventions, indicating that adherence would be best achieved by layered mutually reinforcing systems of interventions (Underhill et al., 2010; Marcus et al., 2014). Models that co-locate PrEP service with a behavioral health or substance-use treatment service show especially high results, including in PWUD getting opioid substitution therapy or opioid use disorder medication, where Opioid consumers adhered to PrEP treatment up to 80-95% (Briggs et al., 2025). Such synergies come about because logistical barriers to adherence, psychological barriers to adherence, and structural barriers to adherence are all dealt with simultaneously. Technology-based interventions of low intensity, including SMS follow-up and short phone counseling, have demonstrated specific advantages as well, which emphasize the scalable nature of the resources available in a resource-constrained environment (Fahs et al., 2021; Marcus et al., 2014).

Remarkably, the review formulates the enduring gaps in behavioral integration studies. The most benefiting populations have included high-risk groups, MSM, transgender groups, and PWUD, although women, adolescents, as well as the communities in the low- and middle-income countries are still underrepresented (Briggs et al., 2025). Trauma, caring responsibilities, and dynamics with the partner are gender-specific issues that need to be addressed through trauma-informed and culturally sensitive methodology to increase compliance in women. Equally, online-based interventions involving young people would help reduce adherence decrease among teenage PrEP users. Such inequalities demonstrate the necessity of intersectional and context-driven implementation to eliminate the expansion of prevention gaps.

From an implementation perspective, the literature focuses on task-sharing, provider education, and incorporation of behavioral screening as part of routine care. Considering the workforce shortage, the effectiveness of behavioral integration based on the peer-based approach, or the lay-counselor approach (e.g., Project Khanya), implies that specialists are not the main determinants of success (Shrestha et al., 2018; Remien et al., 2021). Nevertheless, the purview paradox (when the primary care provider is not ready to promiscuously provide PrEP and behavioral care measures) is an obstacle to scale-up (Bazzi et al., 2019). To address this, there is a need to have clear referral pathways, decision supports, and financing structures that will reimburse behavioral screening and counseling to

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the HIV prevention services. In addition, the literature recommends a need to balance commitment to major behavioral elements and localization in the face of the implementation science frameworks, in which reach, acceptability, and cost-effectiveness are examined. Policy implications are congruent with options to make mental health a part of HIV prevention cascades around the world (Remien et al., 2021). The health systems must integrate behavioral health screening and counseling into the routine of the PrEP procedure, create a reimbursement bonus for the integrated medical care, and track the activation of behavioral-health indicators and biomedical scores. Fair distribution, giving importance to racial and sexual minorities, PWUD, and youth, is essential in the maximization of population-level HIV prevention. There is also evidence that achieving a high economic payoff may be possible through the incorporation of behavioral interventions to help avoid new infections and lower the costs over the long-term expense of untreated HIV and mental illness.

Altogether, the summary of the existing evidence supports the idea that behavioral health integration is not an extra element of successful HIV prevention, but a fundamental element of effective HIV prevention. The operations targeted at psychological preparedness, structural accessibility, and social background are required to sustain PrEP through adherence. By integrating these supports at the PrEP cascade, i.e., uptake all the way to long-term maintenance, biomedical innovations can be optimally transformed into real-world reductions in HIV incidence. The future research needs prioritization to standardized measures of adherence, long-term and cost-effectiveness measures, rigorous trials that focus on women, adolescents, and low-resource populations to seal gaps in available evidence. The application of behavioral health in the context of PrEP provision is, therefore, a realistic, evidence-based approach to the promotion of HIV prevention and universal health justice.

Policy Implications and Recommendations.

1. **Health Systems Integration and Policy Formulation.**

The elements of behavioral health must be institutionalized when it comes to the systems of nationwide and international prevention of HIV. Behavioral and mental health services should be incorporated in the set of mandatory components of PrEP delivery by various health agencies (e.g., WHO, UNAIDS, CDC). Health financing systems should establish a behavioral screening, counseling, and referral code and line of budget. This will make behavioral support independent of pilot funding but entrenched within the health system fabric. To enhance patient-provider relationships and normalize behavioral care in the context of HIV services, provider training should focus on behavioral counseling, stigma reduction, and cultural competence.

2. **Implementation of a Program and Service Delivery.**

To enhance PrEP uptake and retention, integrated service models need to focus on the co-location of mental health and substance-use services. There is evidence to suggest the possibility of integrating behavioral care into the content of methadone or harm reduction programs, where the rate of adherence improved significantly. In low-resource environments, the solutions that involve task sharing, e.g., the practice of use of lay counselors or peer educators, need to be increased to overcome the shortage of workforce without compromising the quality of interventions. Moreover, the technology-based aids, such as SMS reminders or access to mobile counseling, need to be embraced as low-cost, high-impact measures when it comes to adherence.

3. **Fighting HIV and Population Health Results.**

Introduction of behavioral health in PrEP has far-reaching consequences on the cascade of HIV prevention. Initiation, adherence, and persistence rates are also higher with behavioral determinants tackled, and this leads to a direct decrease in risk of HIV infection and transmission. Integration will also help to build equity, as marginalized groups, MSM, transgender people, PWUD, and individuals who are socially or economically vulnerable will have better access. In addition to that, alleviating the stigma and mental health needs will lead to a long-term interest in prevention, testing, and care services. This is in line with the UNAIDS 95-95-95 framework and the world agenda of ending the HIV epidemic by preventing it through a person-centered, inclusive model.

4. **Research and Evaluation Priority.**

Future researchers should examine issues on long-term sustainability, cost-effectiveness, and scalability of behavioral integration among PrEP programs. Standardized measures of adherence are required, integrating biomedical and psychosocial measures, where there is a cross-study comparison. Gender-sensitive, trauma-informed, and culturally sensitive behavioral models should also be prioritized by the researchers through underrepresented populations such as women, adolescents, and low and middle-income country communities with underrepresented groups. These efforts should be implemented using the implementation science frameworks to make sure that they are feasible, equitable, and contextually relevant.

CONCLUSION

This scoping review has shown that the adoption of behavioral health interventions in PrEP programs provokes the choice factor in gauging effective adherence and long-term positive results in HIV prevention. In a series of research studies, psychological, social, and

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structural determinants, including stigma, depression, and trauma, were shown to be important in converting biomedical efficacy into real-life performance. Behavioral techniques, such as motivational interviewing, cognitive-behavioral counseling, and peer support interventions, improve self-efficacy and enable users to adhere to medication regimens despite their psychosocial circumstances. Similarly, digital reminders and phone-based counseling, as forms of low-intensity approaches, prove that behavioral integration can be scalable and long-term.

The data also defines the fact that mental health integration is not complementary, but it is even the basis of the PrEP success. The remaining depressive elements, anxiety, or substance use disorder result in a rapid reduction in adherence to HIV prevention, thus disrupting the entire HIV prevention cascade. Behavioral health integration is, therefore, a paradigm shift, because it takes adherence as an individual entity but perceives it as a behavior supported by the system and affected by psychosocial and structural circumstances. Although implementing behavioral care into habitual PrEP provision can help to close the disparity between biomedical promise and population-level effect, higher rates of HIV prevention can be achieved.

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