Sigma’s 30th International Nursing Research Congress
Exploring the Mechanism of Social Isolation on Appointment Adherence in Older Persons Living With HIV
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Introduction: The advent of antiretroviral therapy has revolutionized HIV-infection management, improved outcomes, and prolonged longevity of persons living with HIV (PLWH). The successful management of the health of older PLWH requires consistent engagement in medical care that integrates multimorbidities and now-chronic HIV infection through lifelong clinic appointments with a healthcare provider. Evidence is limited in studies that examine appointment adherence and specific factors related to suboptimal appointment adherence only among older PLWH. Studies show a consistent association between social support and adherence, suggesting that health may be a downstream factor affected by the effects of social support on adherence (Magrin et al., 2015). However, studies suggest that older PLWH tend to have small social network size (Emlet, 2006) and report loneliness (Greene et al., 2018). Guided by modified Theoretical Model of Loneliness (Hawkley & Cacioppo, 2010), this study used path analysis to test whether social isolation (social network size and loneliness) affected appointment adherence either directly or indirectly through emotion dysregulation in older PLWH. The Theoretical Model of Loneliness postulates that loneliness potentially influences health via emotional and behavioral self-regulation (Hawkley & Cacioppo, 2010), of which it suggests a direct path from loneliness to emotion dysregulation and health behavior (appointment adherence), and an indirect path from loneliness to health behavior via emotion dysregulation. Social network size was added along with loneliness to assess both objective and subjective aspects of isolation simultaneously. We also explored the differences in participant characteristics depending on their level of appointment adherence.

Methods: Older PLWH (≥50 years of age) enrolled in an outpatient HIV clinic in the Southeastern region of the United States were followed for a period of 12 months to assess adherence to their HIV care appointments. Social isolation (social network size and loneliness), emotion dysregulation, and covariates that have been shown in younger PLWH to affect appointment adherence were assessed at baseline. These covariates included: sociodemographic characteristics, disease status, emergent healthcare utilization, depression, HIV-related stigma, substance use, and attitude towards providers (Bulsara, Wainberg, & Newton-John, 2018). Emergent healthcare service use and HIV disease status (viral load, CD 4+ T cell count) were abstracted from patient electronic medical records. Statistical analyses were conducted using SPSS and MPLus. Covariates that showed significant (p<.10) association with appointment adherence in logistic regression were controlled in the subsequent path analysis. To assess the model fit of the proposed path model, several indices were used: the $\chi^2$ test ($\chi^2$), the comparative fit index (CFI), the Tucker-Lewis index (TLI), and the Root Mean Squared Error of Approximation (RMSEA) with a 90% confidence interval (CI). Non-significant $\chi^2$, CFI and TLI of greater than 0.95, and the RMSEA of less than 0.08 indicate a good fit (Hooper, Coughlan, & Mullen, 2008; Kline, 2011).

Results: Participants were 144 older PLWH with a mean age of 56.5 years. Most participants were male (60%), African American/Black (85%), and single (59%).
Seventeen participants reported past homelessness. Appointment adherence ranged from 0% to 100% ($M=81.17$, $SD=25.93$), with 77 participants having 100% appointment adherence. Appointment adherence was dichotomized into two categories (0=suboptimal [≤85%], 1=optimal appointment adherence [>85%]) because our data indicated that this cutoff was associated with clinical outcomes. Past homelessness had high collinearity with the outcome, thusly it was removed from analysis. Appointment adherence was related to income ($B=0.80$, $p=.07$), drug use ($B=-0.28$, $p=.02$), and CD4+ T cell count ($B=1.45$, $p=.05$). Participants in higher income category (> $1,000) were twice more likely than those in lower income category to be optimal appointment adherers. The odds of optimal appointment adherence were reduced by 76% with each additional increase in score for drug use scale. Participants with higher CD4+ T cell count (≥200 cells/mm$^3$) were 4.3 times more likely to be optimal appointment adherers than those with AIDS-defining (<200 cells/mm$^3$) CD4+ T cell count. This model explained 26% of the variance in optimal appointment adherence (Nagelkerke $R^2$) and correctly classified 73.6% of optimal appointment adherence (cut off 0.5). The proposed path model was tested with significant covariates adjusted on appointment adherence. Fit indices reflected a good fit between the model and the sample data: $\chi^2=8.81$ ($p=.46$), CFI=1.00, TLI=1.01, RMSEA<0.001 (90% CI: 0.00-0.09). However, there were no direct or indirect effects of social isolation on appointment adherence.

**Conclusions:** Findings suggest that social determinants of health inequities such as homelessness, low to no income, and drug use are closely linked to appointment adherence among older PLWH. Socioeconomically challenging environments such as lack of stable housing or homelessness and having no or low income may trigger a cascade of stressors that may serve as underlying risk factors for suboptimal appointment adherence, such as having to make a living to avoid financial obstacles and meeting the basic needs as their first priority (Warren-Jeanpiere, Dillaway, Hamilton, Young, & Goparaju, 2014) instead of adhering to scheduled appointments. More studies are needed to clarify the levels of appointment adherence among those with current/past homelessness or with unstable housing and those with socioeconomic and structural inequities, and to evaluate whether providing housing or telemedicine might improve appointment adherence and its subsequent outcomes.

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**Keywords:**
HIV, appointment adherence and social isolation

**References:**
Abstract Summary:
social isolation manifests as objectively (social network size) and subjectively (loneliness), and can influence one’s health care utilization behaviors. This study explored a mechanistic pathway of social isolation on appointment adherence in older HIV+ patients. Key correlates of appointment adherence in older HIV+ patients are also explored.

Content Outline:
1. Introduction
   1. Importance of appointment adherence in older persons living with HIV (PLWH)
2. Appointment adherence and social isolation
3. Social isolation in older PLWH
   1. Older PLWH tend to have small social network size (Emlet, 2006) and report loneliness (Greene et al., 2018)
4. Study hypothesis and theoretical framework
2. Body
   1. Methods
   2. Study participant and settings
   3. Study variables
   4. Data analysis
   5. Results
   1. Appointment adherence cutoff was set at 85% based on the finding that this cut-point was significantly related to clinical outcomes in our sample
   2. Appointment adherence was related to income ($B=0.80$, $p=.07$), drug use ($B=-0.28$, $p=.02$), and CD4+ T cell count ($B=1.45$, $p=.05$) in logistic regression
   3. Social isolation was not related to appointment adherence
4. Conclusion
1. Social determinants of health inequities such as homelessness, low to no income, and drug use are closely linked to appointment adherence among older PLWH.
2. There may be more complex moderating and mediating factors related to appointment adherence.

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