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Family Mechanisms of Structural Ecosystems Therapy for HIV-Seropositive Women in Drug Recovery

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Abstract

Objective—Examined the effects of Structural Ecosystems Therapy (SET), a family intervention for women living with HIV or AIDS, compared to a psycho-educational health group (HG) intervention, and reciprocal relationships between women and family members.

Method—Women ($n = 126$) and their family members ($n = 269$) were randomized to one of two conditions and assessed every 4 months for 12 months. Family functioning, drug use, and psychological distress was reported by multiple family members.

Results—Multilevel growth curve modeling showed a different family functioning trajectory between SET and HG, $B = -0.05$, $SE = 0.02$, $p < .01$. There was no intervention effect on the trajectory of family-level drug abstinence or psychological distress, but there was a significant difference in the trajectory of psychological distress after controlling for change in family functioning, $B = -0.28$, $SE = 0.13$, $p < .05$. There was an indirect effect from treatment through change in family functioning to change in psychological distress, $B = 0.29$, $SE = 0.12$, $p < .05$. With respect to reciprocal effects, family drug abstinence significantly predicted women's abstinence 4 months later, $B = 0.22$, $SE = 0.06$, $p < .001$.

Conclusion—Findings demonstrated the interdependence of family members and the impact of family in relapse prevention and partially supported SET's potential for maintaining family functioning and well-being for women living with HIV or AIDS in drug recovery.

Keywords

AIDS; HIV; drug abuse; family functioning; women; psychological distress

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Treatment advances have transformed HIV and AIDS from mortal illnesses into manageable chronic conditions (Cole, Hernan, Anastos, Jamieson, & Robins, 2007; Palella et al., 1998), yet together HIV and AIDS remain the fifth-leading cause of death for women in the United States, and in 2004 the leading cause of death for black women aged 25–34 years (Centers for Disease Control, 2008). For persons living with HIV or AIDS, mental health affects HIV and AIDS disease processes. Women living with HIV or AIDS experience elevated psychological distress (Bing et al., 2001; Catz, Gore-Felton, & McClure, 2002), which can have a detrimental impact on physical health (Golub et al., 2003; Ickovics et al., 2001; Leserman et al., 2002; Remien et al., 2006). Drug use is associated with poor adherence to HIV treatments (Ramírez García & Côté, 2003; Lucas, Cheever, Chaisson, & Moore, 2001; Sherer, 1998) and stimulant use is associated with immune activation that hastens HIV viral replication (Carrico et al., 2008).

HIV and AIDS are a family disease (Pequegnat & Szapocznik, 2002; Rotheram-Borus, Flannery, Rice, & Lester, 2005). Families are a source of stress as well as support for people with HIV or AIDS and can impact medication adherence (Merenstein et al., 2009; Murphy, Greenwell, & Hoffman, 2002) and health (Jones, Beach, Forehand, & Foster, 2003). Women living with HIV or AIDS have reported that family-related concerns are sources of stresses and strains (Ndlovu, Ion, & Carvalhal, 2010) and that communication with family about illness, the family's denial about the woman's HIV status, their lack of knowledge about transmission, and the woman's past drug use contribute the most stress in family relationships (Owens, 2003). Family members also experience emotional strains, and those dually affected by HIV/AIDS and substance abuse are particularly vulnerable to disruptions, such as loss of child custody (Barroso & Sandelowski, 2004; Conners et al., 2004; Knowlton, Hua, & Latkin, 2005).

Family functioning is a predictor of physical outcomes across a spectrum of conditions (Campbell, 2003; Wiehs, Fisher, & Macaran, 2002). A meta-analysis of various health conditions found that adherence to treatment is 1.74 times higher in patients from cohesive families and 1.53 times lower in patients from families in conflict (DiMatteo, 2004). Recent reviews (Campbell, 2003; Martire, Lustig, Miller, Schulz, & Helgeson, 2004; Wiehs et al., 2002) have shown that family interventions have promise, although with modest effect sizes for addressing physical health conditions. Because family interventions may set in motion positive reciprocal processes among the family, they have the potential to impact family members beyond the identified patient. It is important that trials of family interventions assess changes in family members in addition to changes in the identified patient (Martire et al., 2004; Wiehs et al., 2002).

Studies have tested dyadic family interventions with HIV-seropositive adults, in some cases reporting effects for both members of the dyad. Two interventions for serodiscordant couples reported positive outcomes. Remien et al. (2005) found improved medication adherence with a support-enhancing intervention for the seropositive partner. A recent multisite trial showed that a skill-building intervention reduced sexual risk behaviors in African American couples (El-Bassel et al., 2010). Rotheram-Borus et al. (2003) found that a coping skills intervention for parents with AIDS and their adolescent children reduced emotional distress and problem behaviors.

Structural Ecosystems Therapy (SET; Mitrani, Robinson, & Szapocznik, 2009) is a family intervention for women living with HIV or AIDS. SET transforms interactions in the larger family system, and among the woman, family, and support systems outside of the family to improve the woman's psychosocial functioning and health. Family functioning goals include strengthening support, cohesion, conflict resolution and problem-solving, and establishing boundaries between the woman and drug-using individuals. A randomized trial with African

American women living with HIV and AIDS found that SET was superior to an individual person-centered intervention in reducing psychological distress (Szapocznik et al., 2004) and drug-use relapse (Feaster, Burns, et al., 2010) and improving medication adherence (Feaster, Brincks, et al., 2010).

As a structural and strategic family therapy, the theoretical underpinnings of SET (Minuchin & Fishman, 1981; Szapocznik & Kurtines, 1989) propose that changes in family interactions will set into motion a series of effects on individual family members. Effects on family members will have effects on other family members either directly (i.e., through the individual's interactions with other family members) or indirectly (i.e., by contributing to the creation of a family context that influences family members). Szapocznik et al. (2004) found that SET reduced family hassles and that this reduction partially mediated the effect of SET on psychological distress for women with HIV and AIDS. Szapocznik et al. did not evaluate the impact of SET on family members, and they used only women's report of family hassles. The assessment of family processes should include reports from multiple family members (Kazak, 2008) to yield more reliable and valid assessments (Georgiades, Boyle, Jenkins, Sanford, & Lipman, 2008).

Our study examined intervention effects on family functioning, psychological distress, and drug use reported by multiple family members from a randomized trial comparing SET to a psycho-educational health group (HG) intervention for women with HIV and AIDS in drug recovery. Primary outcomes for women (HIV medication adherence and drug relapse prevention) are reported elsewhere (Feaster, Mitrani, et al., 2010). The trial found that SET, while not improving drug use or medication adherence more than HG, did improve CD4 T-cell count, starting antiretroviral treatment, and theoretical mechanisms of action on drug relapse, including accessing substance abuse services in response to relapse and separating from drug-using household members.

This study reports findings from a companion study of the randomized trial that enrolled family members of the women to investigate the family mechanisms of SET. We hypothesized that:

1. SET would result in a superior trajectory of family functioning compared to HG;
2. SET would result in superior trajectories of family-level outcomes (psychological distress and drug abstinence);
3. Changes in family functioning would be related to changes in family-level outcomes (i.e., family-level outcomes would be partially mediated by family functioning); and
4. Changes in the woman's outcomes (psychological distress and drug use) would predict changes in family member outcomes and vice versa (reciprocal effects).

Method

Participants

Participants were 126 women living with HIV or AIDS in recovery enrolled in a randomized trial comparing SET and HG (Feaster, Mitrani, et al., 2010) and 269 of their family members. To be eligible, women had to have been at least 18 years of age, HIV-1 seropositive, either been prescribed antiretroviral medication or at a stage of HIV infection at which antiretroviral medications would be advised (viral load over 100,000 or CD4 T-cell count under 350 or any AIDS-defining illness), had a substance use diagnosis within the last year (with cocaine as either the primary or secondary drug of abuse) as defined by the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*, been willing to

disclose their HIV status to at least one health provider, and have at least one family member enrolled in the companion study. Women were not required to be substance-free. Recruitment was from 2003–2007. Women's characteristics are in Table 1. A third (33%) of the women lived with other adults without children, 25% lived with minors and adults, 14% lived with minors without adults, and 29% lived alone. Figure 1 shows participant flow. A fuller description of the methods for the randomized trial is presented in Feaster, Mitrani, et al. (2010).

To capture the richness and variety of family networks, we defined family as household members plus others with relationships with the woman that could impact her well-being. A fuller description of the family identification strategy is presented in Mitrani, Weiss-Laxer, et al. (2009). Interviewers used five queries to identify family members: (a) household members (excluding those living in the home as boarders); (b) children of the woman who did not live with her; (c) the primary person(s) who cared for her children; (d) current romantic partner; and (e) anyone who the woman considered a major source of support. Although disclosure was not a criterion for eligibility, the family identification protocol also asked the woman if each family member knew about her HIV status (74% were aware) and drug recovery history (85% were aware).

Eligible family members 6 years of age or older (and not wards of the state), who the woman was willing to involve in the study, were invited to enroll. The current report includes family members who enrolled and had data from at least one assessment point, but excludes children below age 11 because they were not administered the measures in these analyses. On average, family members (excluding the woman) participated in 2.33 assessment points. The average number of members per family (including the woman) was 3.13 ($SD = 1.51$, range: 1–10), and the average age of family members at baseline was 35.53 years ($SD = 16.17$, range: 11–78). Of family members, 40% were first-degree relatives (parents, siblings, and offspring), 26% were partners, 16% were second-degree relatives (grandparents, grandchildren, uncles, aunts, nieces, and nephews), and 17% were extended or nonkin family (steps, in-laws, friends, and church officials).

Structural Ecosystems Therapy

SET (Mitrani, Robinson, et al., 2009) is based on Brief Strategic Family Therapy (Szapocznik & Kurtines, 1989) and adapted for women living with HIV and AIDS. SET targets the woman's social environment by building on existing adaptive interactions and reducing maladaptive interactions within the family and between the woman, family, and other systems (e.g., health care, substance abuse services, religious institutions). Three basic SET techniques are joining, diagnosing, and restructuring (Minuchin & Fishman, 1981; Szapocznik & Kurtines, 1989). *Joining* is the process of establishing therapeutic alliances. *Diagnosing* is identifying problematic interactional patterns and sources of support. *Restructuring* involves orchestrating in-session opportunities for individuals to interact in ways that change problematic interactional patterns and reinforce strengths. The therapist works with the woman to identify and engage members of her family to participate in sessions. As a process-based intervention, SET is not limited to a particular content area. However, in this application of SET, therapists were instructed to address relapse prevention and medication adherence. Intended dosage was 12, 1-hr sessions over 4 months. Sessions were conducted at the woman's home or other locations preferred by the woman and family. The average number of family members (including the woman) present at SET sessions was 2.03 ($SD = 0.78$, range: 1–5). On average, 21% of sessions per case were conducted with the woman alone.

HIV Health Group

HG was selected to control for common factors in therapy, for example, attention, therapist qualities, and client expectancies and was adapted from the Wellness Manual developed by Hartfield (Baker et al., 2003) to replicate a popular program available in the community. Topics included information about HIV adherence and transmission risk reduction. HG groups met biweekly over 4 months for 1.5 hr per session. On average 4.84 ($SD = 2.23$, range: 1 – 9) women attended each group session. Although all sessions were intended as group sessions, there were three sessions attended by only one woman. Family members did not participate in HG. Sessions were conducted in the evening at study offices at a large urban medical campus.

Dosage and Treatment Fidelity

Dosage was comparable across treatments. Engagement, defined as attending two or more sessions, was equivalent (SET: $n = 33$, 56%; HG: $n = 42$, 63%), $\chi^2(1, N = 126) = 0.12$, $p = .44$. There was a small difference in number of sessions (SET: $M = 5.20$, $SD = 5.40$; HG: $M = 3.54$, $SD = 2.96$), $F(1, 126) = 4.75$, $p < .05$, but longer group sessions meant that total time was similar (SET, 312 min; HG, 319 min).

A total of 291 randomly selected videotaped sessions (SET, 221; HG, 70) were rated for fidelity (Feaster, Mitrani, et al., 2010). Two raters were trained to an interrater reliability coefficient of .80 with a supervisor, and they were retrained every 6 months to prevent drift. Overall, 6% of sessions were coded by two raters, yielding an interrater reliability of .98 for SET and .96 for HG. SET was rated on four domains: (a) joining (5 items), (b) tracking and eliciting diagnostic enactments (3 items), (c) creating a context for change (3 items), and (d) restructuring the family system (5 items). Cronbach's alpha for these domains ranged from .76–.88. The content foci of sessions were recorded to assess whether therapists addressed prescribed areas (relapse, medication adherence, and systems outside of the family). HG was rated on four behaviors: joining, promoting group cohesiveness, acting as a “switchboard,” and wrapping up. The extent that topics were covered was rated separately for the eight sessions. Internal consistency was not anticipated because the HG did not have theoretically prescribed behaviors.

Fidelity items for both SET and HG were rated on a 5-point scale, ranging from 1 (*not at all/poor*) to 3 (*fair/somewhat*) to 5 (*extensively/excellent*). Ratings of SET showed fair to average (≈ 3) fidelity (joining, $M = 3.89$, $SD = 0.81$; tracking and eliciting diagnostic enactments, $M = 3.72$, $SD = 0.78$; creating a context for change, $M = 2.58$, $SD = 1.01$; restructuring the family system, $M = 2.41$, $SD = 0.82$). Over a third (38%) of the sessions addressed systems outside of the family, 24% addressed medication adherence, and 49% substance use or relapse. Ratings of HG showed above average fidelity (joining; $M = 4.13$, $SD = 0.68$; promoting group cohesiveness, $M = 3.31$, $SD = 1.01$; acting as a “switchboard,” $M = 4.86$, $SD = 0.39$; wrapping up, $M = 3.17$, $SD = 1.38$; extent that assigned topics were covered, $M = 4.20$, $SD = 0.61$).

Interventionists

SET therapists were two African American women and one Hispanic woman; all were master's level social workers with mean 12.0 years ($SD = 14.0$) of experience. HG facilitators were one African American female certified addiction counselor and one Hispanic female master's level social worker with mean 9.6 years ($SD = 7.2$) of experience.

Procedure

Women were randomized to treatment after baseline assessment. Participants were reassessed at 4 (the intended endpoint of interventions), 8, and 12 months postbaseline. All measures other than demographics were administered at baseline and follow-ups. Procedures were approved by a review board at the University of Miami; all women and family members gave informed consent to participate, parental permission was obtained for children, and children assented. For assessments, participants received \$40 at baseline, \$55 at 4 months, \$75 at 8 months, and \$100 at 12 months.

Measures

The measures used in this study are a subset of a larger battery, and all measures were completed by all family members. Except for measures of drug use, women and family members completed the same measures.

Family Outcomes

Drug use—Use of illicit drugs in the past 30 days for the woman was from the Addiction Severity Index (McGahan, Griffith, Parente, & McLellan, 1986). Family members' reported drug use was from an instrument from the Monitoring the Future Study (Johnston, O'Malley, Bachman, & Schulenberg, 2004). Drug abstinence at each assessment for each family member (including the woman) was coded as 1 = abstinent, 0 = not abstinent.

Psychological distress—We created a single manifest measure of psychological distress by combining two measures that were correlated at all times (average $r_s = .50$). The composite psychological distress variable was the sum of scores standardized at the grand mean of each variable.

Perceived stress: The Perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1983) includes 14 items rated, ranging from 0 (*never*) to 4 (*very often*), that measure the degree to which situations are appraised as stressful (e.g., "How often have you felt nervous and stressed?"). Higher scores indicate more stress. Cronbach's alpha was $> .70$ each time.

Psychiatric symptoms: The Global Severity Index (GSI), from the Brief Symptom Inventory (Derogatis, 1993), is a 53-item self-report measure of psychiatric symptoms over the past 7 days rated on a 5-point Likert scale (0 = *not at all* to 4 = *extremely*). The GSI equals the mean response to the 53 items. Cronbach's alpha was $> .96$ each time.

Family functioning—We developed a latent construct of family functioning from a battery of instruments that assessed multiple domains of family interaction targeted in SET, including support, cohesion, conflict, and coping. The goal was to construct a single composite multidimensional measure of family functioning congruent with the theoretical underpinnings of SET. In brief, our theory was that a single underlying family functioning construct: (a) influences multiple areas of family interactions; (b) is modifiable through SET; (c) can be measured in multiple ways, in this case indirectly by observing the patterns of covariation among measures administered to family members; and (d) support or coping is an area that is influenced by family functioning and will influence both psychological distress and substance use. The measures reported below were included in the final latent family functioning construct. Because we were aiming at a family-wide measure, instruments that were administered only to specific family subsystems (parent– child, couple, or coparents) were excluded. Other measures, including an observational measure, were excluded due to poor reliability or poor fit of the latent construct.

Family coping: Three subscales of the Family Crisis Oriented Evaluation Scales (F-COPES; McCubbin, Larsen, & Olson, 1981) were used. F-COPES asks respondents to rate their coping behavior from 1 (*strongly disagree*) to 5 (*strongly agree*). The Seeking Spiritual Supports subscale refers to relying on the church or God for support or guidance, for example, “seeking advice from a minister.” The Acquiring Social Support subscale is an external coping strategy measured by items such as “asking neighbors for favors and assistance.” The Reframing subscale is an internal coping strategy that refers to changing the perspective of an event, so that a negative event appears positive. Cronbach’s alpha was $> .76$ for Acquiring Social Support, $> .74$ for Reframing, and $> .74$ for Seeking Spiritual Support each time. The Mobilizing Family and Passive Appraisal subscales were not used due to low reliability (Cronbach’s alpha $< .70$).

Family support: The Family Support and Significant Other Support subscales of the Multidimensional Scale of Perceived Social Support (MSPSS; Zimet, Dahlem, Zimet, & Farley, 1988) were used. Items (e.g., “My family really tries to help me,” “My family is willing to help me make decisions”) are rated on a 7-point scale (1 = *very strongly disagree* to 7 = *very strongly agree*). Cronbach’s alpha $> .86$ for Family Support and $> .83$ for Significant Other Support each time.

Family environment: The Family Cohesion subscale from the Family Environment Scale (Moos & Moos, 1994) was used. Family Cohesion measures individual perceptions of the degree of commitment and support in the family. Response options to items (e.g., “There is a feeling of togetherness in our family”) are true or false. In the present study, three reverse-scored items (killing time at home, rarely volunteer at home, and group spirit) were removed to increase internal consistency, Cronbach’s alpha $> .72$ each time. The Family Conflict subscale was not used due to poor reliability (Cronbach’s alpha $< .50$).

Family functioning composite—A family functioning composite was used in all analyses. A multilevel confirmatory factor analysis (CFA) tested whether the family functioning measures (administered to all family members) could be reduced to a single underlying family functioning factor for individual family members (Level 1) and the family as a whole (Level 2), at all four times (baseline through 12 months). Error variances between scales from the same measure (e.g., MSPSS Family Support and Significant Other Support subscales) were correlated. The initial CFA showed that the Seeking Spiritual Support subscale did not load significantly on the family functioning factor and was dropped. Results of the final multilevel CFA showed a good fit for the latent family functioning construct, Comparative Fit Index (CFI) = .94, root mean square error of approximation (RMSEA) = .06. For analysis, separate measures were standardized with the grand mean, and then summed into a single family functioning composite. Because the resulting composite was negatively skewed, a square root transformation of the reversed scale was used to improve normality. The family functioning composite was then reversed a second time, so that higher scores would denote “better” family functioning. The composite mean was 2.35 ($SD = 0.43$), and ranged from 1.00–3.41. The latent family functioning construct explained a large amount of within-level variation in the Acquiring Social Support ($R^2s = .24-.28$), Reframing ($R^2s = .22-.28$), Family Support ($R^2s = .58-.74$), Significant Other Support ($R^2s = .23-.30$), and Family Cohesion ($R^2s = .38-.42$) subscales; and a moderate-to-large amount of between-level variation in the Acquiring Social Support ($R^2s = .09-.55$), Reframing ($R^2s = .14-.68$), Family Support ($R^2s = .98-.99$), Significant Other Support ($R^2s = .07-.74$), and Family Cohesion ($R^2s = .21-.64$) subscales.

Analysis Plan

Hypotheses were tested with a series of multilevel latent growth curve models in Mplus, Version 5.21 (Muthén & Muthén, 2007), using an intention-to-treat design. Psychological distress and drug use were analyzed separately. Change over time was modeled as a latent factor within individual family members at Level 1, and between families as a group at Level 2. In this framework, each variable was decomposed into uncorrelated within- and between-level (family) factors, which provided distinct estimates on both levels (Muthén & Asparouhov, 2009). Differential fit (linear vs. quadratic) was tested with the Bayesian information criterion (BIC; lower values equal better fit; Schwarz, 1978). Linear fit better than quadratic change for psychological distress, drug use, and family functioning and was used throughout analyses. In Hypotheses 1–3, the entire family (including the woman) was included in the within- and between-family analyses. The latent growth factors were the units of analysis, with variability between individuals' reports of family functioning and psychological distress or drug use modeled as within-family outcomes at Level 1, and variability between families in family functioning and psychological distress or drug use modeled as between-family outcomes at Level 2. Full information maximum likelihood estimation allowed for the inclusion of all family members across time, regardless of missing data, and was robust to different numbers of family members in families.

The modeling strategy described above allowed us to test the treatment effect on the change in family functioning over time (Hypothesis 1), the treatment effect on change in family (the woman and family members) drug use and psychological distress over time (Hypothesis 2), as well as the indirect effect from treatment to change in family functioning to change in family drug use or psychological distress at the family level (Hypothesis 3). Latent growth curves were modeled for changes in family functioning and family drug use and psychological distress across 12 months with latent intercept and latent slope factors. One latent intercept represented the baseline level of family functioning and one latent intercept represented the family outcome. One latent slope factor represented change in family functioning and one latent slope factor represented change in family outcomes. Paths from treatment condition, a dummy-coded variable (0 = SET, 1 = HG), to the latent slope terms for family functioning (Path *a*) and to the family outcome were included. Separate models were analyzed for psychological distress and drug abstinence. The model was extended for Hypothesis 3 to include Path *b* from the latent slope in family functioning to the latent slope of psychological distress or drug abstinence at Level 2. The indirect effect, $a*b$, was tested using a 95% confidence interval (CI) around this product (Krull & MacKinnon, 2001).

To test reciprocal relationships (Hypothesis 4), two cross-lag models were analyzed—one for psychological distress and one for drug abstinence. These models separated the woman from her family members. The family outcome for psychological distress was represented by the mean psychological distress of family members (excluding the woman). The family outcome for drug abstinence was a binary indicator of whether all family members (except the woman) reported abstinence from illicit drugs. Outcomes for the woman were her psychological distress and drug abstinence. In each cross-lag model, the family outcome at a single time (4, 8, and 12 months, respectively) was regressed on the woman's outcome at the previous time (baseline, 4, and 8 months, respectively), and in the same way the woman's outcome at a single time was regressed on family's outcome at the previous time. Autoregressive paths were also included for woman's and family's outcome, such that baseline outcomes predicted outcomes at 4 months, 4 months predicted 8 months, and 8 months predicted 12 months. Consistency constraints (equivalent coefficients across all time points) fit the data well and were imposed as recommended by Kessler and Greenberg (1981).

Results

There were no significant baseline differences in psychological distress, drug abstinence (either the woman or family members), or family functioning between intervention conditions.

Hypothesis 1: Family Functioning Effects

The trajectory of family functioning over time differed significantly between SET and HG, $B = -0.05$, $SE = 0.02$, $p < .01$. HG had worse family functioning over time, but SET was stable. At 12 months postbaseline, there was a medium-sized difference (Cohen's $d = .57$) in family functioning between conditions. A follow-up analysis explored whether the worsening of family functioning in HG was an iatrogenic effect or reflected the natural trajectory of family functioning in this population by examining the family functioning trajectory of families with women who did not attend any SET or HG sessions. There was evidence of significant deterioration in family functioning over time, $B = -0.04$, $SE = 0.02$, $p < .05$, indicating that SET countered deterioration of family functioning over time, rather than HG caused family functioning to worsen.

Hypothesis 2: Family-Level Outcomes (Psychological Distress and Drug Abstinence)

There was no significant difference in the trajectory of psychological distress over time, $B = -0.02$, $SE = 0.08$, $p < .85$, or of drug abstinence over time, $B = 0.01$, $SE = 0.28$, $p = .96$, between SET and HG. Figure 2 shows the intervention effects on change in family functioning and psychological distress and the relationship between change in family functioning and psychological distress.

Hypothesis 3: Relationship Between Family Functioning and Family-Level Outcomes

Changes in family functioning for all family members were significantly related to changes in psychological distress for all family members, $B = -6.26$, $SE = 1.49$, $p < .001$. After controlling for change in family functioning, there was a significant difference in the trajectory of psychological distress, $B = -0.28$, $SE = 0.13$, $p < .05$. The indirect effect ($a*b$) from treatment through change in family functioning to change in psychological distress was significant, $B = 0.29$, $SE = 0.12$, $p < .05$, 95% CI [0.56, 0.53]. Changes in family functioning were not related to changes in family level drug abstinence, $B = 0.28$, $SE = 5.66$, $p = .96$.

Hypothesis 4: Reciprocal Effects Between Women and Their Family Members

Model fit for psychological distress was not acceptable, CFI = 0.79, RMSEA = 0.15. Model fit for drug abstinence was acceptable, CFI = 0.92, RMSEA = 0.07, and was improved, CFI = 0.95, RMSEA = 0.06, with additional autoregressive paths for the woman (drug abstinence at baseline predicting drug abstinence at 8 months, and drug abstinence at 4 months predicting drug abstinence at 12 months). Family drug abstinence predicted the woman's drug abstinence, $B = 0.19$, $SE = 0.06$, $p < .001$, odds ratio = 1.21. This result indicated that the woman's odds of abstinence were greater in families with no members using illicit drugs. There was a nonsignificant trend for the woman's drug abstinence to predict whether all family members were abstinent from drugs, $B = 0.10$, $SE = 0.05$, $p = .06$. Figure 3 shows reciprocal relationships. A follow-up analysis examined reciprocal relationships with drug abstinence for adult family members and the woman. The model fit was not acceptable, CFI = .90, RMSEA = .08, but parameter estimates were of similar, but slightly smaller, magnitude.

Discussion

Results supported some hypotheses about the family mechanisms of SET. SET prevented deterioration of family functioning. This deterioration might be part of the natural history among families of women living with HIV and AIDS in recovery. It is possible that family functioning starts out relatively strong as the family unites to rally around a member recently in recovery, but without intervention this unity gradually erodes. We did not find direct effects of SET on psychological distress or drug abstinence, but found evidence that the lack of deterioration in family functioning among families in SET may have led to reduced psychological distress for the aggregated women and family members. That is, there was a significant positive mediating effect of treatment assignment on psychological distress that worked through family functioning such that when SET helped to reduce distress in the family it was acting through the mechanism of maintaining family functioning. Finding an indirect effect of SET working through family functioning without finding a direct effect of SET on psychological distress suggested that a mechanism other than family functioning, not measured in this study, had an impact on psychological distress in HG (Shrout & Bolger, 2002; Krause et al., 2010). Women in HG had a decline in family functioning relative to SET that would have caused an increase in psychological distress in HG. However, an unmeasured factor compensated for the decline in family functioning, which then manifested as reduced psychological distress for HG in the model that included family functioning.

With respect to reciprocal effects between the women and their family members, we were unable to test psychological distress due to poor model fit. But we found that drug abstinence among family members predicted abstinence in the women 4 months later. There was a trend for the woman's abstinence to predict family members' abstinence. The finding that women were more influenced by their family members than vice versa makes sense given that the study identified the family network with the woman as the center (i.e., those with whom she lives, those who provide support, etc.). Also, it may be that the women were more reactive to those around them given their recent drug recovery.

Health providers for women with HIV and AIDS have long recognized the important role that families play in their patients' health, and that family members are seriously affected when their mother, sister, wife, or partner has HIV or AIDS (e.g., Campo, 2004). Despite this recognition, the majority of psychosocial approaches for women with HIV and AIDS are focused on the individual (Rotheram-Borus et al., 2005). Family interventions can be more costly and difficult to deliver than individual approaches, but potentially add value by transforming the social context that can have longer-lasting effects on the health of the woman and family members. Key premises of SET are that families affected by HIV and AIDS have resources that are activated by correcting problematic interactions and strengthening positive interactions, and that these changes are self-reinforcing and become part of the family's structural makeup. SET's effect on family functioning was maintained 8 months after the end of the intervention, suggesting that the families adopted the interactional changes and thus were able to sustain family functioning well after treatment terminated. In contrast, family functioning in HG families declined steadily during the same period. Therefore, although we did not detect a direct impact of SET on family-level psychological distress and drug abstinence, it is possible that the effect of SET on family functioning could have benefits for the women and their family members over the longer term.

Further research is needed to develop effective family intervention models and to improve the efficacy of SET by identifying therapeutic mechanisms of action that are most closely linked to health outcomes. Although studies have demonstrated the effectiveness of family

interventions for adults with HIV and AIDS, research examining family functioning and outcomes for affected family members has been limited to children (e.g., Forehand et al., 2002; Lester et al., 2010) and romantic partners (El-Bassel et al., 2005; El-Bassel et al., 2010). Conducting family intervention research for physical health conditions is methodologically challenging (Kazak, 2008), and for HIV-seropositive adults it is difficult to identify, engage, and retain members of extended and nontraditional family systems (Mitrani, Weiss-Laxer, Ow, Burns, Ross, & Feaster, 2009). The current study demonstrated that family research does not require uniformity of family types, constellations, or size. Our family-level measure yielded a usable model with adequate fit despite a flexible, expanded definition of family.

Although study outcomes were encouraging, the modest effects should be viewed as a starting point to refine SET. Family engagement and treatment utilization must be improved to maximize benefits and cost-effectiveness. Only 56% of women attended two or more sessions of SET. Although not statistically different from the rate of engagement in HG, there is room for improvement. An analysis of predictors of treatment engagement (Mitrani, Feaster, Weiss-Laxer, & McCabe, 2011) demonstrated that women with low levels of physical and mental malaise, a higher level of readiness for change, and living with children were more likely to engage in both interventions. Future intervention studies could focus on groups who might be likely to use SET, or attempt to improve engagement through motivational strategies. The suboptimal levels of SET fidelity, including conducting individual sessions that likely constrained the treatment effect, point to the need to improve the training and supervision protocol.

Other limitations warrant caution in interpreting the results. The convenience sample of women living with HIV or AIDS limited generalizability. Drug use of women and family members was self-reported. Although there was agreement between the urine screens of women and self-reports in the larger trial (Feaster, Mitrani, et al., 2010), family members did not provide urine samples, which could have led to less candid reports. Although we attempted to include an observational measure as part of the family functioning construct, our composite measure was self-reported. This study focused on a common measurement model for family functioning and identifying the impact of the intervention on the typical family member, but did not explore differences or the impact of differences between family members. Models to analyze these effects exist (Feaster, Brincks, Robbins, & Szapocznik, 2011) and future research should address differences within the family.

Despite the limitations and modest effects, the findings provided partial support for SET as a means to ameliorate psychological distress in families affected by HIV by preventing the deterioration of family functioning. These findings demonstrated the interdependency of family members and the impact of family for preventing relapse, an important factor for maintaining the health of persons with HIV and AIDS. The demonstrated effect of SET on family functioning supported the potential of a family approach for improving and maintaining the well-being of women with HIV and AIDS in recovery and perhaps for women in recovery more broadly.

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Figure 1. Participant flowchart following CONSORT guidelines. SET = Structural Ecosystems Therapy.

Figure 2.

Change in family functioning was hypothesized to mediate the effect of intervention on the change psychological distress. Latent growth model *without* the path from the family functioning trajectory to the psychological distress trajectory (Hypotheses 1 and 2) (a). Latent growth model *with* the path from the family functioning trajectory to the psychological distress trajectory (Hypothesis 3) (b). HG = health group; SET = Structural Ecosystems Therapy. * $p < .05$. ** $p < .01$. *** $p < .001$.

Figure 3.

Final model of reciprocal relationships between drug abstinence of the women living with HIV or AIDS and drug abstinence of her family members. The final model was modified to have two additional autoregressive paths than the original model. 0 = baseline. 4 = 4 months. 8 = 8 months. 12 = 12 months. Assumptions of consistency constraints were not rejected ($\chi^2 = 14.89, p = .09$). The model with paths constrained to be equal across all times fit the data better (Bayesian information criterion [BIC] = 761.40) than an equivalent model with paths free to vary across time (BIC = 784.97). CFI = Comparative Fit Index; RMSEA = root mean square error of approximation. ** $p < .01$. *** $p < .001$.

Table 1**Baseline Characteristics of the Women Living With HIV or AIDS**

Characteristic	<i>M (SD) or n (%)</i>	
	SET (<i>n</i> = 59)	HG (<i>n</i> = 67)
Age (years)	44.10 (0.90)	42.20 (1.00)
Less than high school education	41 (73.2%)	53 (79.1%)
Hispanic	8 (13.6%)	7 (10.5%)
African American	42 (71.2%)	58 (86.6%)
Never married, not cohabitating	19 (33.9%)	34 (50.8%)
Annual household income (\$)	7,796 (1,025)	7,551 (933)
CD4 T-cell count	467.7 (36.3)	519.3 (39.6)
Log viral load	3.03 (0.18)	2.94 (0.17)
Years since HIV diagnosis	9.40 (0.80)	10.40 (0.70)
Years of substance abuse	22.7 (1.3)	21.2 (1.2)
Cocaine dependence	57 (96.6%)	62 (92.5%)
Alcohol dependence	41 (69.5%)	51 (76.1%)
Cannabis dependence	19 (32.2%)	34 (50.8%)
Opioid dependence	10 (17.0%)	18 (26.9%)
Dependent on multiple substances	44 (74.8%)	56 (83.6%)

Note. No significant differences at $p < .05$. SET = Structural Ecosystems Therapy; HG = health group.