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Relationship functioning and substance use in same-sex male couples

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Abstract

Background: Research suggests that substance use among partnered sexual minority men will be inversely associated with the quality of dyadic functioning. We tested whether dimensions of relationship functioning implied within Couples Interdependence Theory (e.g., rewards, costs, barriers, alternatives, investment, and comparison to an ideal) predicted drug use and problematic alcohol use consistent with this hypothesis.

Methods: This study utilized baseline data from a sample of 70 couples recruited in the New York City area. All participants were cis-gender male and 18 or older. In each couple, at least one partner reported recent drug use, and at least one was HIV negative. Participants provided demographic information; completed measures of relationship functioning and problematic alcohol use; and reported recent (past 30 day) drug use.

Results: Actor-partner interdependence models were calculated. The use of miscellaneous recreational drugs (excluding marijuana) was positively associated with participants' perception of rewards, costs, and barriers to leaving and negatively associated with comparisons to an ideal, alternatives, and investment. In addition, partner perceptions of rewards were positively associated with this outcome. AUDIT scores were negatively associated with comparison to an ideal; and positively associated with partner perceptions of alternatives. Relationship functioning was unrelated to marijuana use.

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Contributors

Tyrel Starks planned the study which produced the data and was primarily responsible for formulating the research question and conducting analyses.

Gabriel Robles contributed to the literature review and discussion. He was integral in the organization of the study rationale and theoretical conceptualization.

Stephen Bosco, Kendell Doyle, and Trey Dellucci participated in the formulation of the research question and contributed substantive subsections of the introduction and discussion. Trey Dellucci also conducted descriptive analyses and assisted in the creation of tables. All authors have read and approved of the submission.

Conflict of Interest

The authors do not have any conflicts of interest to disclose.

Conclusions: These findings provide support for the hypothesis that relationship functioning and substance use are related. Couples Interdependence Theory implies such an assumption and it underlies many couples-based approaches to drug use intervention. These findings point to the potential utility of integrating relationship skill building into drug use interventions for partnered sexual minority men.

Keywords

Same-Sex Male Couples; Relationship Functioning; Drug And Alcohol Use; Sexual Minority Men; Substance Use And Relationships

1. Introduction

Sexual minority men report elevated rates of substance dependence (Lanfear, Akins, and Mosher, 2013) and substance use relative to their heterosexual counterparts (Austin and Bozick, 2012; Corliss et al., 2010; Flentje et al., 2015; Lanfear et al., 2013). In particular, sexual minority men have reported greater life-time use of “club drugs” such as MDMA/ecstasy, GHB, methamphetamine, cocaine (Corliss et al., 2010; Flentje et al., 2015), as well as greater binge drinking (Dermody et al., 2014; Lanfear et al., 2013) and marijuana use (Talley, Sher, and Littlefield, 2010). Centers for Disease Control and Prevention (CDC; 2016) report that sexual minority men are more likely to use alcohol and drugs as well as report more problems later in life associated with substance use .

Substance use is a particular concern among sexual minority men due to its association with sexual risk behaviors, specifically, condomless anal sex (CAS) (e.g., Centers for Disease Control and Prevention, 2017; Feinstein and Newcomb, 2017; Tomkins et al., 2018). Aggregated data indicate that sexual minority men who use drugs are more likely to engage in CAS (Burnett et al., 2018; Parsons et al., 2013) and event-level analyses suggest that the probability of CAS increases on days drugs are used (Melendez-Torres et al., 2016; Rendina et al., 2015). The link between substance use and CAS has particular importance given the disproportionate rates of HIV infection observed among sexual minority men. Recent estimates indicated that gay, bisexual and other men who have sex with men account for 67% of individuals living with HIV, and 70% of new HIV infections each year (Centers for Disease Control and Prevention, 2017).

A modest but growing body of research has examined drug use specifically among sexual minority men in relationships (e.g., Lewis et al., 2006; Mitchell, 2016; Parsons and Starks, 2014). This work has been largely catalyzed by epidemiological data, which indicated that primary partnerships represent an important vector for HIV infection. An estimated 35-68% of recent HIV infections among sexual minority men occurred within the context of a primary partnership, opposed to casual or anonymous partners (Goodreau et al., 2013; Sullivan et al., 2009). Much like their single counterparts, partnered sexual minority men who use drugs during sex report more sexual HIV transmission risk (Brown et al., 2017; Mitchell et al., 2016; Parsons et al., 2017).

One of the most consistent findings in the early literature on drug use among partnered sexual minority men is that it is strongly associated with the agreements or understandings

couples form regarding the occurrence of sex with partners outside of their relationship (Parsons and Starks, 2014). The phenomenon of sexual agreements has been well-documented in male couples (Hoff and Beougher, 2010; Rios-Spicer et al., 2019). Agreements can vary along a continuum from monogamous (where sex with outside partners is prohibited) to open (where sex with outside partners is permitted) (Hoff and Beougher, 2010; Parsons et al, 2013; Starks, et al., 2018) with substantial variability in the rules and expectations about permissible behaviors and communication (Grov et al., 2014). Men in monogamous relationships tend to report lower rates of substance use generally and are less likely to use substances during sex relative to those in non-monogamous relationships (Mitchell, 2016; Parsons et al., 2013). Additionally, monogamous relationships tend to have patterns of substance use which are more similar, as opposed to partners in open or monogamish ("play together") sexual arrangements (Parsons and Starks, 2014).

To date, research examining the correspondence of drug use with aspects of dyadic functioning beyond sexual agreements has been very limited among sexual minority men. Emerging work in this area has largely drawn upon *Couples Interdependence Theory* (CIT). CIT provides a framework for understanding: 1) how partners influence behavior and 2) how relationship functioning comes to be associated with health outcomes.

CIT posits that couples must confront situations, which – at times – are characterized by interdependence. This means that the achievement of one partner's goals is reliant, entirely or in part, on the actions or cooperation of the other partner. The process of interdependence consists of a series of interactions; when immediately confronted with a situation of conflicting interests partners' first instincts are often to maximize their own personal gain regardless of the cost to their partner or relationship. This initial reaction or response phase is referred to as the given situation (Rusbult et al., 1991). In successful relationships, partners continue on to consider how their actions affect their partner and their relationship as a whole, transforming the given situation into an effective situation (Rusbult et al., 1991; Yovetich and Rusbult, 1994). This transformation of motivation (Kelley and Thibaut, 1978; Rusbult et al., 1991; Yovetich and Rusbult, 1994) catalyzes the creation of joint goals – termed accommodation (Rusbult et al., 1998; Rusbult and Van Lange, 2003; Rusbult et al., 1991; Yovetich and Rusbult, 1994). Joint goals are shared by both partners in the couple and their accomplishment is enhanced by access to individual- and couple-level resources (Rusbult and Van Lange, 2003).

Joint-goals are – in many respects - compromises which sacrifice some aspects of each partners' individual ideal. Rusbult et al. (1991) have suggested that accommodation inherently involves some aspects of self-sacrifice. Rusbult suggested that willingness to tolerate personal sacrifice for the benefit of the relationship is – in part – a function of multiple relationship factors, including: satisfaction, commitment, and centrality. Relationship satisfaction – or overall happiness with the relationship – represents the relationship's approximation to an ideal as well as the presence of relatively high rewards and low cost. Commitment is defined as high levels of investment and a positive assessment of the relationship as compared to other alternative relationships. Finally, centrality refers to the importance of one's relationship and the extent to which an individual's life would be disrupted by the loss of the relationship. Building on this work, Kurdek et al. (1995, 1998)

developed the Multiple Determinants of Relationship Commitment Inventory (MDRCI) scale as a measure of relationship functioning consistent with CIT.

CIT would suggest that couples with better relationship functioning (higher satisfaction, commitment, and centrality) might be more successful at setting goals, limits and expectations around drug use, which mitigated use. In an analogous manner, many behavioral and cognitive-behavioral approaches to couples' substance use treatment (e.g., Fals-Stewart et al., 2009; Powers et al., 2008; Starks, Millar, et al., 2018; Wu et al., 2011) assume that substance use has a reciprocal association with dyadic functioning. Consistent with this premise, among heterosexual samples the use of various substances has been associated with lower relationship satisfaction (Rauer et al., 2008; Whisman et al., 2000), decreased partner support and lower sexual satisfaction (Newcomb, 1994), as well as greater risk of relationship dissolution (Leonard et al., 2014). Furthermore, greater overall relationship quality was protective against heavy drinking and marijuana use among low to moderate frequency users of alcohol and marijuana use – but not among heavy users of these substances (Fleming et al., 2010).

Despite its central position in couples-based approaches to substance use treatment, research on the association between relationship functioning and drug use among sexual minority men has been limited almost exclusively to studies of sexual agreements (Mitchell, 2016; Parsons and Starks, 2014; Parsons et al., 2013). Starks et al. (2015) found that the expectancy that drug use will enhance emotional intimacy during sexual encounters was a significant predictor of drug use among single sexual minority men; however, no studies have directly examined whether intimacy or emotional investment in a relationship is associated with drug use among men in a same-sex relationship. This gap in the literature potentially limits the development, adaptation and application of couples-based approaches to drug treatment. To address this, the purpose of the current study was to test associations between relationship functioning and drug use reported by men in a same-sex relationship. Informed by previous research, we hypothesized that better relationship functioning, defined as higher levels of MDRCI subscales associated with satisfaction, commitment, and centrality, would predict decreased drug use.

2. Methods

2.1. Participants and Procedures

Data were taken from the baseline assessment of the *We Test* study. The overall purpose of We Test was to develop and pilot test adjunct components for Couples HIV Testing and Counseling (Centers for Disease Control and Prevention, 2011) tailored for male couples and addressing the needs of emerging sexual minority male adults. As such, eligible couples were recruited from the New York City metropolitan area. All participants were able to communicate in English, aged 18 or older, and identified as cis-gender male. The inclusion criteria regarding gender identification reflect the study's larger focus on understanding factors associated with HIV transmission, which may vary meaningfully across high-risk subpopulations (e.g., Centers for Disease Control and Prevention, 2017; Feinstein and Newcomb, 2017). All couples were sexually active together, meaning primary partners report recent (past 30 days) oral or anal sex. In each couple, at least one partner was aged 18

to 29; one was HIV-negative; and one reported at least one day of drug use in the past 30 days. Couples were ineligible if either partner reported the occurrence of severe physical or sexual intimate partner violence and indicated they did not feel safe in their current relationship.

Participants were recruited between January 2016 and August 2017 through a variety of online and in person strategies. Online strategies included ads on social networking sites (e.g., Facebook and Instagram), dating sites (e.g., Adam4Adam.com) and applications (e.g., Grindr, Scruff, and Hornet), as well as LISTSERVs (administered by nightlife party promoters) utilized by men who have sex with men. In person strategies included a passive component (e.g., fliers and study post cards distributed at general lesbian, gay, bisexual, transgender, and queer (LGBTQ) community events) and active components (e.g., in person recruitment screening conducted at bars, nightclubs, and community events specifically frequented by sexual minority men).

An index approach to recruitment was utilized (Johnson et al., 2012; Mitchell, Lee, and Stephenson, 2016), in which one partner in the couple was initially screened. Regardless of recruitment method, index participants initially completed a brief online screener to establish preliminary eligibility. Those index participants who screened preliminarily eligible were asked to provide contact information. Subsequently, study staff contacted index participants and conducted a telephone screener. Participants whose preliminary eligibility was confirmed on the telephone screener were then asked to schedule a baseline appointment at a time both they and their partner could attend.

At the baseline appointment, partners in the couple were consented separately and age-verification was obtained from both partners. Subsequently, partners completed the baseline assessment, which was comprised of a computer-administered quantitative survey, privately in separate assessment rooms. Each partner received $30 for completion of the baseline survey. All procedures were approved by the Hunter College institutional review board.

2.2. Measures

2.2.1. Demographics.—Participants indicated their age, race and ethnicity, education, individual income, HIV serostatus (positive, negative, unknown). Participants also provided information related to the duration of relationship (in months). Where partners' estimation of relationship length differed, responses were averaged.

2.2.2. Sexual Arrangements.—Similar to other studies (Parsons, Starks, et al., 2013; Parsons, Starks, Gamarel, and Grov, 2012), relationship arrangement was assessed using a single item asking participants to report how they and their partners "handled sex outside of their relationship." Participants who reported "neither of us has sex with others, we are monogamous," or "I don't have sex with others and I don't know what my partner does" were classified as monogamous. Those who reported, "only I have sex with others," "only he has sex with others," "both of us have sex with others separately," "we both have sex with others separately and together," or "I have sex with others, and I don't know what my partner does" were classified as open. Those who reported "both of us have sex with others together" were classified as monogamish (Parsons et al., 2013).

The 70 couples reported on how they handle sex outside the relationship. Of these, 28 concurred they were monogamous, 12 concurred they were monogamish, and 25 concurred they were open. In the remaining 5 couples, one partner in the relationship said they only had sex with their main partner (monogamous), and the other partner said they had sex with partners outside of their main relationship (open). Consistent with previous studies, these couples were coded as discrepant (Parsons, Starks, et al., 2013; Starks, Doyle, Millar, and Parsons, 2017).

2.2.3. Relationship Functioning.—Relationship functioning is conceptualized within Kurdek's (1995, 1998) work on relationship commitment, in which he argues that relationship commitment is a common and widely used indicator of relationship functioning – or dysfunction. The Multiple Determinants of Relationship Commitment Inventory (MDRCI) identifies six determinants that provide unique information regarding relationships; r*ewards* (e.g., "One advantage to my relationship is having someone to count on"); *cost* (e.g., "I give up a lot to be in my relationship"); *comparison to ideal standard* (e.g., "My current relationship comes close to matching what I would consider to be my ideal relationship"); *attractiveness of alternatives* (e.g., "As an alternative to my relationship, I would like to date someone else"); *investments* (e.g., "I've put a lot of energy and effort into my relationship"); and *barriers* (e.g., "I would find it difficult to leave my partner because I would feel obligated"). Each subscale contained 4 items. Respondents used a 5-point Likert-type scale ranging from strongly disagree (1) to strongly agree to (5) to indicate how much they agreed with each statement. Across all partners, Cronbach a for the rewards, costs, comparison, alternatives, and barriers subscale scores were .83, .80, .80, .74, and .61, respectively.

The investments subscale had poor reliability (α = .48) when all 4 original items were used. An examination of α with item deleted analyses revealed that the removal of one item ("A part of me is tied up in my relationship.") substantially improved reliability. Cronbach's α for the 3-item subscale – omitting this item – was .69. As a result, the 3-item variant of this subscale was utilized in subsequent analyses.

2.2.4. Problematic Drinking.—Problematic drinking was measured using the 10-item scale of Alcohol Use Disorders Identification Test (AUDIT; Bohn et al., 1995). The AUDIT is comprised of three sections; quantity of consumption, problems related to drinking, and injury related to drinking. A 5-point Likert scale was used to assess drinking frequency (1 item; *0 = Never to 4 = 4 or more times per week*), quantity of alcohol consumption on a typical drinking day (1 item; *0 = 1-2 drinks to 4 = 10 or more drinks*), and problems relate to alcohol consumption (6 items; *0 = Never to 4 = Daily or Almost Daily*). A 3-point Likert scale was used to assess physical injury to self or others as a result of drinking (*0=No to 2 = Yes, during the last six months*) and concern from others (*0=No to 4=Yes, during the last 6 months*). All 10 items were summed to create a total scale score and higher scores indicating greater problematic drinking.

2.2.5. Drug Use Instances.—Participants were asked whether they used marijuana, cocaine, ecstasy/ketamine/gamma-hydroxybutyrate, prescription sedatives (e.g. Xanax, Valium), prescription stimulants (e.g. Adderall, Ritalin), and prescription painkillers (e.g.

Vicodin, Percocet) in the previous 30 days with a yes/no response option. Questions about prescription medications specifically indicated that use occurred "for fun or to get high." For each substance the participant indicated using, they then reported the number of days on which the substance was used in the previous 30 days. Due to the frequency of reported use, the number of days of marijuana use was modeled separately from other substances. For drugs other than marijuana, data were aggregated into a single variable indicating the cumulative total number of days reported.

2.2.6. Analytic Approach.—The similarity of partners' demographic characteristics was evaluated using the intra-class correlation (ICC) for normally distributed quantitative variables and κ for categorical variables, specifically measuring the similarity between the index partners and their recruited partner. Both of these statistics vary between −1.0 and 1.0 with large absolute values indicating a greater proportion of the variable's variance is accounted for by couple membership. Subsequent analyses were analyzed using the Actor-Partner Interdependence Model (APIM) framework (Kenny et al., 2006). The APIM is a multi-level modeling approach. At Level I (the individual or partner level), the model distinguishes between actor and partner effects. *Actor effects* quantify the association between participants' score on an outcome and their own score on a predictor variable. In contrast, *partner effects* quantify the association between participants' scores on an outcome and their partners' scores on a predictor. The model also incorporates Level II couple-level variables such as relationship length and sexual arrangement, in which both members of the couple have identical responses.

We calculated APIM regression models using Mplus v8 for each outcome (miscellaneous recreational drug use instances, marijuana instances, and problematic drinking). In these models, the outcome was predicted by actor and partner effects of relationship functioning (MDRCI scores) as well as age, race and ethnicity, and HIV status at Level I, and by sexual arrangement and relationship length at Level II.

3. Results

3.1 Descriptive Statistics

Demographic information and descriptive data for the sample are reported in Table 1. The average age of participants was 27.01 years (SD = 5.80). More than half identified as a racial or ethnic minority (54.3%) and completed a 4 year college degree (62.1%). Over half of the sample (61.4%) reported an individual income of $20,000 or more annually. The majority of the sample (92.1%) reported being HIV-negative. Couples had been together for an average of 26.5 months (SD = 24.70), or approximately 2 years and 3 months.

With regard to drug use, 80% of the sample indicated using at least one of the drugs assessed in the past 30 days (See Table 2). The average number of drug use days reported across all substances assessed was 12.86 (SD = 13.2). Marijuana was the most commonly reported substance (75% reported at least one instance of use in the past 30 days), followed by cocaine (17.9%), and ecstasy/ketamine and GHB (12.9%). The average AUDIT score was 7.73 (SD = 0.47).

3.2. Bivariate Analyses of Sexual Arrangement Group Differences in Demographic Characteristics and Relationship Functioning

A majority of participants (40%) indicated being in a relationship characterized by a monogamous arrangement. Among non-monogamous couples, 35.7% were in an open arrangement, 17.1% in a monogamish arrangement. Partners reported discrepant arrangement perceptions in 7.1% of couples. While education, annual income, HIV status, and age did not differ across arrangement-category, men in monogamous relationships reported significantly shorter relationship duration compared to open men. Notably, there were no significant between-arrangement group differences on dimensions of relationship functioning.

Couple membership accounted for a significant amount of variance in race and ethnicity. Interestingly, the extent of racial similarity between index partners and their partners was greater among White (κ = .67) and Black (κ = .74) men compared to Latino men (κ = .28). Education and income showed moderate (and statistically significant) degrees of partner similarity (κ = .42, .34, respectively). Notably, ICCs indicate that partners' responses were not statistically dependent on most measures of dyadic functioning. Only perceived costs and comparison to an ideal relationship showed small to moderate between-partner similarity (κ = .28, .38, respectively).

3.3. Marijuana Use Instances And Relationship Functioning

Results of the APIM predicting marijuana use are contained in Table 3. No relationship functioning measures or demographic characteristics were significantly associated with marijuana use. At Level II, neither relationship length nor sexual arrangement was significantly associated with instances of marijuana use.

3.4. Miscellaneous Recreational Drug Use Instances And Relationship Functioning

Results of the APIM predicting miscellaneous recreational drug use instances are contained in Table 4. Miscellaneous recreational drug use was modeled as a Poisson distribution after testing a negative binomial distribution revealed that the dispersion parameter was non-significant. The actor effects for all 6 dimensions of relationship functioning assessed by the MDRCI were statistically significant. Rewards, costs and barriers were positively associated with miscellaneous recreational drug use instances; meanwhile, comparisons, alternatives, and investments were negatively associated with miscellaneous recreational drug use instances. In contrast, only the partner effect of rewards was statistically significant. Men whose partners had higher rewards scores reported more instances of miscellaneous recreational drug use.

With regard to demographic covariates, partner age and partner HIV status were significantly associated with miscellaneous recreational drug use. Men with older partners reported more instances of miscellaneous recreational drug use and men whose partners were HIV-positive reported fewer. No other demographic effects were significantly associated with miscellaneous recreational drug use instances.

At Level II, relationship length was negatively associated with the use of other drugs. In contrast to bivariate tests of between-group differences, men in monogamish and open relationships reported significantly more instances of miscellaneous recreational drug use compared to monogamish men in the multivariable APIM model. Men in discrepant relationships did not differ significantly from monogamous men. Rotation of the sexual arrangement referent category revealed that monogamish and open groups did not differ significantly from one another and men with discrepant relationship arrangements did not differ significantly from any group.

3.5. Problematic Drinking and Relationship Functioning

Results of the APIM model predicting AUDIT scores are contained in Table 5. The actor effect of comparisons was negatively associated with AUDIT scores while the partner effect of alternatives was positively associated with AUDIT scores. All other relationship functioning subscale effects were non-significant. No demographic effects were significantly associated with AUDIT scores. At Level II, the effects of relationship length and sexual arrangement were also non-significant.

4. Discussion

This study represents one of the first to test the assumptions of CIT as they relate to substance use among partnered sexual minority men utilizing dyadic data. The study therefore had the opportunity to examine both actor and partner effects of multiple determinants of relationship functioning. The findings both conform with and challenge previous notions about the nature of associations between relationship functioning and substance use. Consistent with expectations, indicators of poor relationship functioning was predictive of higher AUDIT scores; meanwhile, in contrast marijuana use was unrelated to dyadic functioning in this sample. Perhaps most interesting was a pattern of associations which suggested that the use of drugs other than marijuana is characterized by contradictory assessments of the relationship – a phenomenon discussed in detail below.

APIM findings related to alcohol use were consistent with CIT in a reasonably straightforward manner. Participants who perceived that their relationship better approximated their ideal had lower AUDIT scores, while men whose partners reported more desire for alternatives to their current relationship reported higher AUDIT scores. From a CIT perspective (Rusbult, 1983; Rusbult et al., 1991), approximation to an ideal represents an aspect of relationship satisfaction while desire for alternatives represents an aspect of commitment – with greater attraction to relationship alternatives indicating lower commitment. This finding is consistent with previous work on links between relationship functioning and alcohol-related problems conducted in studies of individual heterosexual partnered persons (Rauer et al., 2008; Whisman, 2013)

This combination of low personal satisfaction with the relationship (captured in the actor effect of comparisons to an ideal on AUDIT scores) and low partner commitment (captured by the partner effect of attractiveness to alternatives) has the potential to present a unique challenge for providers seeking to intervene on problematic drinking in sexual minority male couples. It is plausible that high levels of problematic drinking are associated with

diminished perceptions of at least some aspect of relationship functioning in both the heavy drinker and their partner. CIT would posit that would diminish both men's willingness to make sacrifices and therefore the couple's ability to achieve successful accommodation.

The result is that intervention may need to incorporate some focus on the facilitation of dyadic functioning. Many couples' substance use interventions typically assume that substance use has a reciprocal association with relationship functioning. While there is variability across intervention approaches, they commonly incorporate elements that are meant to enhance communication skills and relationship satisfaction as well as partners' abilities to reinforce behavior change and empathize with one another (Fals- Stewart et al., 2009; Newcomb et al., 2017; Wu et al., 2011). Several initial studies have examined the feasibility, acceptability and/or efficacy of couples-based substance use intervention with same-sex couples and initial findings are promising (Starks et al., 2019; Starks et al., 2018; Wu et al., 2011).

Furthermore, it is plausible that diminished partner commitment may make it more difficult to obtain the participation of partners in intervention activities – especially in relatively more lengthy or intensive interventions (Hoff and Beougher, 2010). While dyadic interventions provide an optimal opportunity for the couple to practice relationship skills in vivo during session, not all couples are able or willing to participate in sessions jointly, and requiring dyadic participation may limit participation of some sexual minority men in relationships (Starks et al., 2015). Providers may therefore need interventions options, which are sufficiently flexible to address relationship factors in the context of individual as well as dyadic interventions.

The pattern of associations between relationship functioning and miscellaneous recreational drug use was substantially more complicated than that associated with AUDIT scores. Dimensions of relationship functioning indicative of satisfaction had contradictory associations with this outcome. Consistent with hypothesis, higher relationship costs and lower comparison to an ideal relationship (both indicators of lower relationship satisfaction) were associated with a higher odds of miscellaneous recreational drug use; however, higher rewards (an indicator of higher relationship satisfaction) also predicted a greater likelihood of use. Analogous contradictory associations were observed in dimensions of commitment. Lower relationship investment (indicative of lower commitment) predicted higher odds of miscellaneous recreational drug use; but so did lower attraction to alternatives (indicative of higher commitment). Finally, contrary to hypotheses, centrality (indicated by barriers to leaving the relationship) was positively associated with the odds of miscellaneous recreational drug use.

This larger pattern illustrates the potential utility of a multi-dimensional conceptualization of aspects of relationship functioning. CIT theory generally has proposed a monotonic association between relationship functioning (satisfaction, commitment, and cohesion) and outcomes influenced by the accommodation process (Rusbult et al., 1991). Consistent with this framework, previous research – utilizing a uni-dimensional measure to operationalize satisfaction – has found that the use of drugs other than marijuana is associated with lower relationship satisfaction (Newcomb, 1994; Rauer et al., 2008). These findings suggest that

facets of satisfaction and commitment may have contradictory associations with drug use. Furthermore, satisfaction, commitment and cohesion might be associated with use in divergent directions. This opens up the novel possibility that the use of drugs other than marijuana is characterized by some degree of ambivalence – or contradictory impressions of the relationship – both within and across aspects of relationship functioning.

In some respects, these findings – like those related to problematic drinking – generally suggest that the incorporation of intervention components, which facilitate relationship functioning may enhance the efficacy of interventions which aim to reduce drug use among sexual minority men in relationships. These findings related to miscellaneous recreational drug use suggest that providers might also be able to utilize the concept of ambivalence – and strategies for responding to it – that have been developed in existing paradigms as a starting point for developing strategies for responding to ambivalence about the relationship. Motivational Interviewing (MI) has long acknowledged that people may feel two ways about change (Miller and Rollnick, 2013). MI provides a framework and guidance for the use of skills, which help to draw out the client's own reasons for change while diminishing the occurrence and intensity of arguments against change. It is plausible that similar skills might be applied to draw out those aspects of the relationship that men value and diminish the occurrence and intensity of speech that undermines relationship quality. This may help providers manage and mitigate the occurrence of conflict between partners in session and thereby increase their ability to participate in other activities (such as joint problem solving or communication skill building) that would enhance relationship functioning.

Contrary to hypotheses, marijuana use was unrelated to perceived relationship functioning as well as sexual arrangements. While it is possible that marijuana use is simply more strongly associated with individual rather than dyadic correlates, it is also plausible that the association between marijuana use and relationship functioning varies across subgroups of couples. Flemming et al. (2010) found that the association between relationship quality and marijuana use (as well as heavy drinking) varied with severity of use. Among low and moderate users, relationship quality was negatively associated with use; however, among heavy users of these drugs, relationship quality was positively associated with use (Fleming et al., 2010). In a similar vein, couples with concordant marijuana use are more likely to report greater relationship satisfaction compared to couples with discordant marijuana use (Crane et al., 2016). Concordant marijuana use could indicate a degree of common interests and values as well as mutual experiences of positive affect and behavioral responding elicited through use (Testa et al., 2018). Future studies powered to test potential moderators of the association between drug use and relationship functioning are needed to examine the potential for such subgroup differences.

Previous studies have found that men in monogamous relationships are less likely to use drugs compared to non-monogamous men (Mitchell et al., 2014; Parsons and Starks, 2014; Parsons et al., 2013). In contrast, no significant bivariate between-group differences in drug use were observed in the current sample. This finding must be understood in the context of substance use eligibility criteria, which required that at least one partner in the relationship to report drug use. Previous studies have not included this restriction (Mitchell, et al., 2016; Parsons and Starks, 2014; Parsons, et al., 2013). Interestingly, after controlling for

relationship functioning and demographic factors, men in monogamish and open arrangements did report significantly more instances of miscellaneous recreational drug use compared to monogamous men. This finding highlights the salience of the link between sexual arrangements and drug use even among couples where some level of use is ubiquitous. It further points to the need to consider the predictive utility of sexual arrangements within the broader context of relationship functioning. This suggestion is consistent with assertions that sexual agreements (or arrangements in this case) may in some respects constitute a component of relationship functioning for sexual minority men (Neilands et al., 2009).

These findings must be understood in light of several limitations. The self-reported and cross-sectional data were collected from a sample of men in a same-sex relationship who were predominantly well-educated and primarily White. The representativeness of the sample is further limited by the fact that it was drawn from a single large urban center using convenience sampling methodologies. Urban areas have been shown to increase relationship stability among same-sex couples as these geographic areas provide a greater sense of social support and social acceptance due to higher concentrations of same-sex couples as well as sexual minorities (Balsam et al., 2017; Manning et al., 2016). The analyses were limited to couples in which at least one member of the couple was between the ages of 18-29 and reported an HIV-negative serostatus. These findings may not apply to older men in same-sex relationships. In addition, the limited number of serodiscordant couples and the exclusion of couples in which both partners are HIV-positive further limits generalizability.

Despite these limitations, these findings provide some support for the integration of components, which facilitate relationship functioning into substance use interventions for sexual minority men in relationships. CIT generally, and couples' approaches to substance use treatment specifically, have generally been predicated on the assumption that relationship functioning, and substance use are associated. These findings suggest that such assumptions are robust with respect to problematic alcohol use and the use of drugs other than marijuana. They highlight the utility of continued substance use intervention development and research aimed at relationship mechanisms.

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Highlights

- Relationship functioning predicted AUDIT scores in a sample of male couples.
- Relationship functioning predicted the use of miscellaneous recreational drugs.
- Relationship functioning may be a mechanism for drug use intervention.

Table 1.

Demographic characteristics.

			Monogamous	Monogamish	Open	Discrepant		Between Group Difference	Partner Similarity
	n (%)		***n (%)***	***n (%)***	***n (%)***	***n (%)***		**(*df*) Wald χ^2**	**κ**
$n_{individual}$	140 (100)		56 (40.0)	24 (17.1)	50 (35.7)	10 (7.1)		--	--
Race and Ethnicity									
White/European	64 (45.7)		23 (41.1)	14 (58.3)	22 (44.0)	5 (50.0)		(1) 2.20	0.67**
Black/African American	23 (16.4)		14 (25.0)	0 (0.0)	9 (18.0)	0 (0.0)		(1) 0.00	0.74**
Latino	35 (25.0)		13 (23.2)	7 (29.2)	11 (22.0)	4 (40.0)		(1) 1.48	0.28*
Other	18 (12.9)		6 (10.7)	3 (12.5)	8 (16.0)	1 (10.0)		(1) 0.01	0.11
Education								(3) 6.24	0.42**
< a 4 year college degree	53 (37.9)		25 (44.6)	4 (16.7)	20 (40.0)	4 (40.0)			
4 year degree or more	87 (62.1)		31 (55.4)	20 (83.3)	30 (60.0)	6 (60.0)			
Annual Income								(3) 6.54	0.34**
Less than $20,000	54 (38.6)		25 (44.6)	4 (16.7)	21 (42.0)	4 (40.0)			
$20,000 or more	86 (61.4)		31 (55.4)	20 (83.3)	29 (58.0)	6 (60.0)			
HIV Status								(2) 2.91†	0.52**
Negative	129 (92.1)		50 (89.3)	21 (87.5)	48 (96.0)	10 (100)			
Positive	11 (7.9)		6 (10.7)	3 (12.5)	2 (4.0)	0 (0)			
	M (*SE*)		*M* (*SE*)	*M* (*SE*)	*M* (*SE*)	*M* (*SE*)		*F* (3,66)	ICC
Age	27.01 (0.49)		26.86 (0.81)	28.00 (1.23)	26.30 (0.86)	29.10 (1.91)		0.47	0.08
Relationship duration (in mos.)	26.50 (2.95)		17.37 (4.48)[a]	26.50 (6.85)[a,b]	36.71 (4.74) [b]	26.70 (10.61)[a,b]		2.93*	††
Relationship Functioning									
Rewards	17.81 (0.21)		17.55 (0.35)	18.16 (0.54)	18.10 (0.37)	17.00 (0.84)		0.83	0.16
Costs	10.52 (0.28)		10.71 (0.52)	10.12 (0.79)	10.42 (0.55)	11.00 (1.23)		0.19	0.28**
Comparison to Ideal	15.75 (0.25)		15.30 (0.42)	16.21 (0.65)	16.24 (0.45)	14.70 (1.01)		1.28	0.38**
Alternatives	9.50 (0.25)		9.82 (0.41)	8.71 (0.63)	9.34 (0.44)	10.40 (0.98)		1.05	0.14
Investment	15.53 (0.18)		15.23 (0.29)	16.08 (0.45)	15.60 (0.31)	15.60 (0.69)		0.86	0.09
Barriers	15.32 (0.23)		15.50 (0.39)	15.58 (0.60)	14.82 (0.41)	16.30 (0.93)		0.41	0.14

			Monogamous	Monogamish	Open	Discrepant		Between Group Difference	Partner Similarity
	n (%)		***n (%)***	***n (%)***	***n (%)***	***n (%)***		**(*df*) Wald χ^2**	**κ**
AUDIT	7.72 (0.46)		7.59 (0.87)	10.38 (1.33)	6.60 (0.92)	7.80 (2.06)		1.83	0.44 **

* $p < 0.05$,

** $p < 0.01$;

† Due to an observed cell count of zero, data were analyzed without the *Discrepant* category;

†† Not applicable. Responses were identical by definition

Table 2.

Drug use and sexual arrangements.

	Overall		Monogamous	Monogamish	Open	Discrepant	Test
	n (%)		*n (%)*	*n (%)*	*n (%)*	*n (%)*	(*df*) Wald χ^2
Reported use of:							
Marijuana	105 (75.0)		40 (85.1)	17 (73.9)	41 (93.2)	7 (87.5)	(3) 4.48
Cocaine	25 (17.9)		10 (21.3)	6 (26.1)	6 (13.6)	3 (37.5)	(3) 2.98
Ecstasy/ketamine/gamma-hydroxybutyrate	18 (12.9)		5 (10.6)	5 (26.1)	4 (9.1)	3 (37.5)	(3) 5.12
Prescription sedatives (e.g. Xanax, Valium)	13 (9.3)		5 (10.6)	0 (0.0)	8 (18.2)	0 (0.0)	†
Prescription stimulants (e.g. Adderall, Ritalin)	9 (6.4)		2 (4.3)	2 (8.7)	4 (9.1)	1 (12.5)	(3) 1.34
Prescription painkillers (e.g. Vicodin, Percocet)	9 (6.4)		4 (8.5)	0 (0.0)	4 (9.1)	0 (0.0)	†
Any recent drug use	112 (80.0)		43 (76.8)	20 (83.3)	41 (82.0)	8 (80.0)	(3) 0.65
	M (SE)		*M (SE)*	*M (SE)*	*M (SE)*	*M (SE)*	
Drug Use Instances	12.86 (1.12)		12.55 (1.74)	12.38 (2.63)	13.76 (2.01)	11.30 (3.73)	(3) 4.35

* $p < 0.05$,

** $p < 0.01$

† Between group differences could not be calculated due to cell count sizes

Table 3.

Relationship functioning as a predictor of marijuana instances

Marijuana Instances			
	B	**95% CI**	***β***
Rewards			
Actor	−0.01	(−0.18, 0.17)	−.03
Partner	−0.04	(−0.17, 0.09)	−.29
Costs			
Actor	−0.08	(−0.19, 0.03)	−.77
Partner	0.06	(−0.03, 0.14)	.55
Comparison			
Actor	−0.07	(−0.21, 0.07)	−.53
Partner	−0.03	(−0.13, 0.07)	−.23
Alternatives			
Actor	0.05	(−0.03, 0.14)	.43
Partner	−0.06	(−0.16, 0.04)	−.48
Investment			
Actor	0.15	(−0.04, 0.34)	.72
Partner	0.02	(−0.15, 0.19)	.10
Barriers			
Actor	0.003	(−0.09, 0.10)	.02
Partner	−0.07	(−0.16, 0.03)	−.51
Age			
Actor	−0.01	(−0.06, 0.04)	−.14
Partner	−0.01	(−0.06, 0.04)	−.23
Race			
Actor	−0.09	(−0.68, 0.51)	−.13
Partner	0.12	(−0.43, 0.68)	.17
HIV status			
Actor	−0.14	(−1.21, 0.93)	.11
Partner	0.02	(−0.88, 0.91)	.01
Relationship Length	0.00	(−0.02, 0.01)	−.54
Sexual Arrangement			
Monogamish	−0.26	(−1.00, 0.48)	−.63
Open	0.17	(−0.40, 0.73)	.51
Discrepant	−0.01	(−0.91, 0.90)	−.01

* $p < .05$;

** $p < .01$

Table 4.

Relationship functioning as a predictor of miscellaneous recreational drug use

	Drug Use Instances		
	B	**95% CI**	***β***
Rewards			
Actor	0.27**	(0.19, 0.36)	.56
Partner	0.22**	(0.13, 0.31)	.45
Costs			
Actor	0.07*	(0.01, 0.13)	.21
Partner	0.04	(−0.02, 0.09)	.10
Comparison			
Actor	−0.16**	(−0.22, −0.09)	−.35
Partner	−0.06	(−0.13, 0.01)	−.14
Alternatives			
Actor	−0.15**	(−0.21, −0.08)	−.35
Partner	−0.02	(−0.08, 0.04)	−.06
Investment			
Actor	−0.14**	(−0.25, −0.03)	−.21
Partner	0.07	(−0.04, 0.19)	.11
Barriers			
Actor	0.12**	(0.06, 0.18)	.27
Partner	0.02	(−0.03, 0.08)	−05
Age			
Actor	0.02	(−0.003, 0.04)	.09
Partner	0.07**	(0.05, 0.09)	.36
Race			
Actor	0.33	(−0.08, 0.74)	.14
Partner	0.08	(−0.32, 0.48)	.04
HIV status			
Actor	−0.04	(−0.60, 0.51)	−.01
Partner	−2.56**	(−3.46, −1.65)	−.58
Relationship Length	−0.04**	(−0.05, −0.03)	−1.04
Sexual Arrangement			
Monogamish	0.65**	(0.34, 0.97)	.28
Open	0.56**	(0.26, 0.86)	.30
Discrepant	0.04	(−0.53, 0.62)	.01

* $p < .05$;

** $p < .01$

Table 5

Relationship functioning as a predictor of problematic drinking (AUDIT)

	AUDIT Scores		
	B	**95% CI**	***β***
Rewards			
Actor	0.26	(−0.26, 0.79)	.16
Partner	−0.04	(−0.57, 0.48)	−.03
Costs			
Actor	−0.08	(−0.46, 0.31)	−.07
Partner	−0.36	(−0.74, 0.03)	−.30
Comparison			
Actor	−0.51**	(−0.96, −0.07)	−.35
Partner	−0.36	(−0.08, 0.81)	−.24
Alternatives			
Actor	0.18	(−0.23, 0.60)	.13
Partner	0.48*	(0.06, 0.89)	.34
Investment			
Actor	0.24	(−0.44, 0.93)	.11
Partner	0.27	(−0.42, 0.96)	.12
Barriers			
Actor	0.12	(−0.26, 0.49)	.08
Partner	−0.14	(−0.52, 0.23)	−.10
Age			
Actor	−0.04	(−0.20, 0.12)	−.06
Partner	−0.02	(−0.18, 0.15)	−.02
Race			
Actor	−0.48	(−2.62, 1.67)	−.06
Partner	2.02	(−0.12, 4.17)	.25
HIV status			
Actor	−2.45	(−6.01, 1.12)	−.16
Partner	0.74	(−2.83, 4.30)	.05
Relationship Length	−0.03	(−0.08, 0.02)	−.21
Sexual Arrangement			
Monogamish	2.82	(−0.25, 5.89)	.28
Open	−0.53	(−3.21, 2.16)	−.07
Discrepant	0.05	(−4.19, 4.28)	.00

* $p < 0.05$.

** $p < 0.01$.