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'Breaking the Cycle' of maternal substance use through relationships: a comparison of integrated approaches

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ABSTRACT

Background: To compare a novel relationship-focused intervention (RFI) for maternal substance use, offered through 'Breaking the Cycle (BTC)', to standard integrated treatment (SIT). Although SIT focuses on the mother-child relationship tangentially by providing basic parenting information, RFI involves a central focus on promoting healthy maternal relationships with a particular emphasis on fostering mother-child interactions.

Method: Measures in the domains of addiction, relationship capacity, and mental health were administered to 65 women receiving RFI and 25 receiving SIT, at intake (T1) and one year later (T2).

Results: While both groups of mothers improved in addiction severity, women receiving RFI also improved in mental health functioning and relationship capacity. Improvements in relationship capacity predicted addiction severity, over and above improvements in abstinence self-efficacy, social support, and mental health.

Conclusions: Findings highlight the importance of a relationship-focus in assisting mothers to make broad changes that support addiction recovery. Implications and future directions are discussed.

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Mothers; addiction; relationship-focused intervention; relationship capacity; attachment security; young children

Introduction

The prevalence rate of substance use disorder is on the rise among women in North America (Brady & Ashley 2005; Grucza et al. 2008; Keyes et al. 2008), the majority of whom are of child bearing age (Dawe et al. 2000; Pepler et al. 2002; Tracy & Martin 2007). This trend is concerning especially given that mothers often avoid seeking treatment due to feelings of shame and guilt around substance use and prenatal substance exposure (Cox 2000), stigma associated with substance use and parenting (Brady & Ashley 2005) and threat of custody loss (Poole & Isaac 2001; Kail & Elberth 2002). The aim of this study was to compare two approaches to intervention for maternal substance use that attempt to address such barriers to treatment for mothers with substance use issues: standard integrated treatment (SIT) that includes basic parenting services as an adjunct to core addiction services, and a novel, relationship-focused intervention (RFI) that considers maternal relationship capacity (i.e. the ability to function adaptively in all interpersonal relationships; Livesey 1998) as the target of treatment.

Why a focus on relationships?

Mothers who use substances and their children exposed to substances prenatally often exhibit difficult interactional patterns (Pajulo et al. 2001; Suchman et al. 2005). The children exhibit challenging temperaments characterized by poor affective control that require extra patience and support, while the mothers demonstrate dysregulated thoughts, emotions, and behaviors that limit their capacity to respond sensitively and overshadow their children's needs (Pajulo et al. 2001, 2006; Suchman et al. 2004, 2008). In addition, the parenting style of the mothers is often authoritarian and controlling, while at the same time permissive and neglectful (Eiden et al. 2011). As discussed by Suchman et al. (2005), this lack of sensitivity to the child's needs is likely related not only to substance use, the stress associated with a substance-using lifestyle, and guilt regarding prenatal substance exposure, but also to several relationship factors. These may include: ongoing stress due to single parenthood and lack of social support; limited personal experience with a sensitive caregiver and related to this, unrealistic maternal and child expectations (Flykt

et al. 2014) and poor reflective capacity (i.e. a lack of ability to take the child's perspective; Suchman et al. 2006). Past physical and sexual abuse, present-day trauma in adult romantic relationships and previous child custody loss may also contribute towards parenting ambivalence.

Unresolved relationship trauma is associated with substance use initiation and poor treatment outcomes, including low retention rates, continued substance use and ongoing mental health difficulties (e.g. Kang et al. 1999; Greenfield et al. 2002; Simpson & Miller 2002; Lansford et al. 2010; Appleyard et al. 2011). Given the links among maternal relationships, trauma and substance abuse (e.g. Simpson & Miller 2002; Ellis et al. 2004; Trulsson & Hedin 2004; Suchman et al. 2005, 2006; Hien et al. 2010; Lansford et al. 2010; Flykt et al. 2014), learning to recognize and establish positive relationships represents a critical step in the process of recovery, particularly for mothers who are substance dependent (Cosden & Cortez-Ison 1999; Pajulo et al. 2006). This process may also be necessary for a healthy mother-child relationship.

Intervening to promote a positive mother-child relationship in treatment for women who use substances may be particularly beneficial as the transition to motherhood may present a 'window-of-opportunity' in which women may be especially motivated to make life changes, including reducing substance use (Trulsson & Hedin 2004; Tracy & Martin 2007; Leslie 2011). Indeed, empirical evidence from the attachment and neurophysiological literatures shows that fostering the mother-child bond in addiction treatment can facilitate the biasing of dopaminergic reward systems away from substance use toward maternal care (for discussion, see Pajulo et al. 2006, 2012).

Integrated approaches

A growing body of evidence exists in support of integrated interventions that address barriers to treatment for mothers by providing combined addiction- and parenting-related services (e.g. Milligan et al. 2010, 2011; Niccols et al. 2010b; Suchman et al. 2010, 2012). Most of these programs provide instrumental parenting support (i.e. child care, basic information on child developmental and behavior management) or target parental behaviors (e.g. reflective capacity). In a review of programs in Canada for mothers with substance use issues, Niccols and colleagues (2010b) found that the majority of programs do not include children in service, nor do they promote the mother-child dyadic relationship *directly* (Niccols et al. 2010a; cf. Berlin et al. 2013). Yet, the provision of such services is critical given that

instrumental support alone (e.g. behavior management strategies) can exacerbate mother-child relationship difficulties in the absence of a relational focus. Children usually experience such behavioral strategies as punitive when the emotional connection between mother and child is not first addressed (see Suchman et al. 2004 for a relevant discussion). Given the role of trauma and relationships in women's addiction and recovery, what also seems to be missing, and what is needed, is a broad, relationship-focused approach that encapsulates maternal interpersonal connections more generally by promoting the mother's ability to identify and form healthy relationships in all aspects of her life (i.e. relationship capacity; Livesey 1998).

Present study

The primary aim of the present study was to explore whether a RFI produces greater improvements in maternal addiction, relationship capacity, and mental health than standard integrated treatment (SIT). Based on previous research (Suchman et al. 2010), we predicted that both groups of women would demonstrate gains in addiction recovery; however, these gains would be greater for women receiving RFI that recognizes the critical role of relationships in addiction and recovery. Although we expected women in both interventions to achieve a broad range of positive personal outcomes based on attachment (Ainsworth et al. 1978) and relational theories (Covington & Surrey 1997), we predicted that a relationship focus would produce greater improvements in relationship capacity and mental health than SIT.

A secondary aim of this study was to explore mechanisms of change. Whereas traditional addiction treatment models primarily target abstinence self-efficacy (e.g. Cummings et al. 2010) and integrated approaches additionally focus on trauma and mental health (e.g. Niccols et al. 2010b), a RFI emphasizes maternal relationships (Pajulo et al. 2006, 2012). We hypothesized that improvements in relationship capacity would be associated with lower addiction severity at T2 and account for significant variance over and above other contributors to addiction outcomes, including initial level of addiction severity, increases in abstinence self-efficacy, and improvements in mental health.

Methods

Ethics approval was received from the Participant Review Committee, Office of Research Ethics at York University, and the procedures followed were in accord with the standards of this committee for research

involving human subjects. All women provided informed consent prior to participating in the study.

Interventions

At their core, both the RFI and the SIT compared in this study are integrated interventions. That is, they address the parenting needs of mothers with substance abuse issues by combining parenting support with addiction services. The two interventions are offered to mothers who are pregnant or parenting children under the age of seven. Mothers access (through self-agency or other referral) and engage in the interventions on a voluntary basis. Both are holistic (i.e. considering all aspects of the mother's life), multi-faceted interventions (i.e. offering a menu list of services) that include basic needs support (e.g. food, clothing, childcare during counseling, advocacy, case management and service coordination) and weekly counseling appointments in the early phase of service. Additional programming (e.g. individual- and group-based addiction, mental health or parenting support) is recommended on a weekly basis depending

on dyadic needs and availability (which varies based on factors such as maternal employment, child custody agreement, daycare placement, group scheduling) (see Table 1).

For both interventions, mothers in the later stages of recovery/treatment – typically after the first year of service – access appointments with reduced frequency (e.g. bi-weekly to monthly). Ongoing service is provided by addictions counselors until mutually agreed upon addiction and/or parenting goals are met, until all children in the mother's care age out of the program, or until the mother disengages from service (i.e. misses six consecutive appointments in a row), at which point the file is closed. Although abstinence is ideal, outcomes that reduce harm are encouraged, such as strengthening the mother-child bond and minimizing the impact of substance abuse on this relationship and on the child's wellbeing (i.e. a harm-reduction approach; Wong et al. 2011). To reduce potential overlap in clients participating in the interventions, the control intervention site was located in a different city within the same province, approximately three hours from the RFI site. We chose

Table 1. A comparison of services between the RFI and the SIT control.

Service feature		Service type	BTC (RFI)	Control (SIT)
Target population	Pregnant or parenting women of children up to 6.11 years of age, struggling with substance addiction/recovery	Integrated	Yes	Yes
Structure	Must be a plan to parent	Relational	Yes	No
	Holistic, multifaceted service	Integrated	Yes	Yes
	Emphasis on Harm-Reduction	Integrated	Yes	Yes
Basic needs support	Provisions of food, clothing, transportation costs (to and from service)	Integrated	Yes ^a	Yes ^a
	Child Care	Integrated	Yes ^a center-based licensed daycare	Yes costs covered as needed to access care
	Dedicated Probation Officer (as required)	Integrated	Yes ^a	No
Addiction Counseling	Individual/Family Advocacy	Integrated	Yes ^a	Yes ^a
	Case Management/Service Coordination	Integrated	Yes ^a	Yes ^a
	Individual Addictions Counseling: on site/home-based	Integrated	Yes ^a	Yes ^a
	Relapse Prevention Group	Integrated	Yes ^a	Yes
	Recovery Support Group	Integrated	Yes	Yes
	'Connections' Group (emphasizes association between maternal substance abuse, domestic violence and child development)	Relational	Yes	No
Mental Health	Individual Mental Health Counseling	Integrated	Yes ^a	Yes ^a
	Individual Trauma Counseling/Support for Domestic Violence	Integrated	Yes ^a	Yes
Prenatal Services	Life Skills/Emotion Coping Group	Integrated	Yes	Yes
	Pregnancy Outreach Program	Integrated	Yes ^a	Yes ^a
Instrumental Parenting Support	Basic Parenting support, Child management Strategies and Developmental Education	Integrated	Yes ^a	Yes ^a
	FASD Screening and Diagnostic Assessment (annual)	Relational	Yes ^a	No
	Developmental Screening and Assessment (annual)	Relational	Yes ^a	No
Mother-Child Interactional Support	'Parent-Infant Program': Centre-/Home-based	Relational	Yes ^a	No
	Dyadic Interactional and Developmental Guidance ^b			
	New Mom's Support Group (infant: 0-6 months)	Relational	Yes ^a	No
	'Parent-Child Mother Goose Program' Group	Relational	Yes ^a	No
	'Learning through Play' Group (infant/child: 6 months+) ^c	Relational	Yes ^a	No
	Cooking Healthy Together Group	Relational	Yes	No

Grey highlighting indicates service differences between the RFI and the SIT intervention.

^aIndicates services available to families every week of the year; other services offered depending on needs and availability of the mothers or dyads

^bInteractional guidance incorporated elements of 'Watch, Wait, & Wonder' (Muir et al. 1999); 'Modified Interactional Guidance' (Benoit 2001); and 'Supporting Security' (Wittenberg 2008).

^c'Learning through Play' incorporated Hanen Early language intervention programs (Pepper & Weitzman 2004).

the SIT as a comparison because it represented a stringent control of the RFI. The two were matched in almost every respect, with the exception of the relational elements offered in the RFI (see Table 1 for a comparison of services between the interventions).

The RFI is offered at Breaking the Cycle (BTC) in Toronto, Canada. It is built on the understanding that maternal substance use cannot be addressed as a problem within an individual, in accordance with a medical model, but as a problem arising from relationships since childhood that have been largely traumatic and have impeded development. When women with substance use issues enter the stage of parenting, they often need support learning what children come to know through the healthy attachment relationships from birth – that it is possible to trust and rely on another person. Maternal relationships are the primary target of treatment in the RFI. As such, both mothers and their child(ren) are included in service and every group is co-facilitated by an addictions counselor *and* a parent–infant therapist so that the mother–child relationship is always considered, even when addressing maternal addiction and domestic violence. Additionally, attachment-based interventions that foster sensitive responding in dyadic interactions are provided to *directly* facilitate mother–child interactions. These services are offered individually to the dyad and in groups on a weekly basis or depending on needs and availability (see mother–child interactional supports in Table 1).

The emphasis is also on the mother's ability to form healthy relationships more generally (i.e. relationship capacity). The extensive intake process spanning one month or more, involving clinical assessments, case formulation, and counseling, is designed to build rapport, gain trust, and establish a secure therapeutic connection. Interactions with the counselor are used as a clinical tool for practicing and modeling sensitive responding. In fact, this kind of relational modeling is foundational within all levels of service delivery, from the more proximal staffing and supervisory levels, where relationship-based mentorship (i.e. reflective supervision; Turner 2009 and peer support; Benshoff 1992) is emphasized, to the more distal, organizational and system levels, where collaborative partnerships are leveraged to provide centrally located, coordinated, and comprehensive service (e.g. Hospital for Sick Children – FASD screening; St. Joseph's Health Centre/Toronto Centre for Substance Use in Pregnancy – Pregnancy Outreach Program; Toronto Public Health – New Mom's Support Group/Cooking Healthy Together; Ministry of Community Safety and Correctional Services – probation officer).

Participants

Mothers were recruited to the study from 2006 to 2011; however, recruiting capacity was substantially reduced in two of these years due to limited research personnel. Mothers who engaged the interventions for less than two weeks were not approached for research as the initial engagement period represents a critical time in the mothers' addiction and recovery when safety planning and crisis intervention take precedence. Data available for the RFI indicate that 13% of all mothers accessing the intervention during the recruitment period were excluded for this reason. No other data on this sample were available. To be included in the study mothers had to have: (1) data available on at least one outcome measure at intake (T1); and (2) data available at T2 (scheduled one year following T1) on at least the same outcome measure available at T1. Based on these criteria, data were available for a subset of 91 mothers out of a total sample of 200 who had consented to participating in research, 79 of whom had complete data on all outcome measures. Of these 91 mothers, 66 received the RFI and 25 received the SIT.

Of the 109 mothers who did not meet the inclusion criteria, 15 had not reached their T2 assessment period (i.e. missing T2 data), 13 refused to participate after T1, and 81 discontinued service before reaching their T2 assessment period and could no longer be reached by phone, email, Facebook, mail, or alternate contact provided. The high degree of attrition reflects the high rate of transiency in the residence and contact information of the participants, the fluid and voluntary nature of the interventions, and the challenges in conducting research in a clinical context where clinical work takes precedence and mothers are reluctant to divulge information for fear of child welfare involvement.

Procedures

Clinicians introduced potential participants to the researchers. Mothers were informed that their refusal to participate would not jeopardize their access to treatment, that their participation was optional, and that their information would remain confidential. Most of the data were collected by research staff through questionnaires completed on site, in the community (e.g. local coffee shop), or through the mail. Some demographic data and information necessary for clinical formulation were collected by clinical staff. We attempted to collect the T1 assessment during the intake period (following two weeks of service engagement), and the T2 assessment, at one year following T1. The average time between the T1 and T2 assessment for

Table 2. A comparison of sample characteristics and baseline (T1) measures between the interventions.

Demographic characteristics	<i>M (SD)/valid %</i>		<i>F/χ²</i>	<i>df</i>	Range	
	RFI	SIT			RFI	SIT
Age	29.5 (5.6)	26.8 (7.6)	3.50 [†]	1.91	19–50	20–40
Monthly income	1036.0 (746.9)	1141.3 (671.4)	0.34	1.81	0–4167	0–2800
Years of education	11.87 (2.02)	11.71 (1.42)	0.13	1.89	Gr. 8–PG	Gr. 7–PG ^b
Times convicted	1.6 (1.8)	0.9 (1.2)	3.39	1.88	0–6	0–3
% Single	66.7%	56.0%	0.89	1.91	–	–
% Caucasian	75.8%	96.0%	4.89*	1.91	–	–
% Employed	4.5%	32.0%	12.90**	1.91	–	–
% Transient dwelling ^a	24.6%	16.0%	0.76	1.86	–	–
% Convicted of a crime	58.7%	44.0%	1.57	1.88	–	–
History of abuse % Childhood Physical/sexual abuse	66.2%	76.0%	0.82	1.90	–	–
Parity	1.8 (1.2)	2.0 (1.4)	0.42	1.90	1–5	1–7
% Living with ≥ 1 child	68.2%	68.0%	<0.01	1.91	–	–
% Child welfare involved	96.9%	92.0%	1.03	1.90	–	–
Service Duration (days)	589.7 (434.9)	504.5 (406.5)	0.77	1.91	54–1734	75–1797
% Mandated treatment	11.8%	12.0%	<0.01	1.76	–	–
Primary substance use						
Alcohol	25.8%	16.0%			–	–
Crack/cocaine	45.5%	44.0%			–	–
Other***	28.8%	40.0%			–	–
Polysubstance use	64.0%	63.6%	<0.01	1.91	–	–
Time 1						
ASI	0.25 (0.2)	0.30 (0.3)	1.62	1.85	0.00–0.61	0.00–0.80
DTCCQ	74.1 (21.3)	75.1 (22.7)	0.03	1.83	15–100	25–100
CES-D	18.8 (11.6)	23.6 (17.2)	3.44 [†]	1.86	2–43	0–54
BAI	13.8 (11.2)	19.2 (14.7)	1.82	1.86	0–49	0–44
PSS-FR	10.7 (5.8)	12.7 (5.1)	0.70	1.88	2–20	0–20
PSS-FA	8.6 (6.0)	10.7 (6.9)	1.80	1.88	0–20	0–20
AAS	2.1 (2.2)	1.7 (1.9)	2.58	1.88	3.67–11.8	4–11.3

[†]<0.10, *<0.05, **<0.01. ***Cannabis; Opiates; Amphetamines.

^aTransient = Shelter/Residential Program; ^bPG = post-graduate.

both interventions was 16 months (RFI: *SD* = 5.73; SIT = *SD* = 9.42). Variability in data collection occurred due to the clinically embedded research context, which presented barriers to client access, and the transiency of maternal contact information. Mothers were compensated for their time with \$10 in food vouchers per participation hour.

Based on an intent-to-treat principle, mothers were included in this study regardless of the extent of intervention received. Although the SIT site did not have the capacity or administrative structure to track service data in a manner which enabled us to have reliable information about intensity of service, the intention was to provide weekly service to all clients for the duration of treatment. Also, the policy for both programs was to close client files after they had missed six consecutive appointments in a row. Based on closing dates, over half (56%; *n*(RFI) = 37; *n*(SIT) = 14) of the mothers in this sample were engaged in services one year or more after intake, indicating that over half of the sample received ongoing service (i.e. weekly interventions) between T1 and T2. Mothers, who inconsistently engaged in the interventions, continued to receive weekly 'check-ins' and counseling support over the phone, until the file was closed. All mothers received at least two months of service between T1 and T2 and service duration (days between opening – first day of service

engagement – and closing dates) did not differ between groups (Table 2). Based on a correlational analysis, mothers who engaged in the interventions longer tended to be those with less social support (perceived support from family; $r = 0.23$, $p < 0.05$) and more mental health issues (depression; $r = 0.28$, $p < 0.01$), at T2.

Maternal outcome measures

Treatment outcomes were assessed across three domains: (1) Addiction, (2) Relationship Capacity, and (3) Mental Health. Multiple measures were used to assess outcomes in each domain, and all measures were based on maternal self-report.

Addiction

Addiction severity

We used the Europe Addiction Severity Index (EuropASI; Kokkevi & Harters 1995; an adaptation of the ASI developed by McLellan et al. 1980) to assess addiction severity based on the extent of addiction-related difficulties participants had experienced in the past month. Composite scores were calculated according to the Composite Scores Manual (McGahan et al. 1986) using four items: (1) How much money would you say

you spent during the past 30 days on alcohol?; (2) How many days in the past 30 have you been troubled or bothered by any alcohol/drug problems?; (3) How troubled or bothered have you been in the past 30 days by these alcohol/drug problems?; and (4) How important to you is treatment for these problems? As the majority of women in this study were poly-substance users, alcohol and drug items were combined. Composite scores range from 0 to 1 with higher scores indicating greater addiction severity. A score of 0.17 delineates the threshold for a DSM-IV substance dependence diagnosis (Rikoon et al. 2006) and was used in this study to identify clinical levels of addiction severity. Reliability for the alcohol-related items used was satisfactory (Cronbach's $\alpha = 0.87$; inter-item correlation = 0.53) and consistent with the literature (Alterman et al. 1994).

Abstinence self-efficacy

The Drug-Taking Confidence Questionnaire-8 (DTCQ-8; Sklar & Turner 1999) was used to measure situation-specific self-efficacy to resist alcohol/drug use. Eight high-risk scenarios were presented, and respondents were asked to rate their confidence (from 0% to 100%) in resisting substance use in these situations (e.g. '...if I were angry at the way things had turned out'). The total score is based on the mean of the eight responses, with higher scores indicating greater self-efficacy. Scores above 80% indicate very high self-efficacy (Annis et al. 1997). The DTCQ-8 items demonstrate high reliability (Cronbach's $\alpha = 0.89$; Sklar & Turner 1999), as was the case in this sample (Cronbach's $\alpha = 0.91$; inter-item correlation = 0.57).

Mental health

Depression. The Center for Epidemiological Studies, Depression Scale (CES-D; Radloff 1977) was used to assess depressive symptoms. The CES-D is a 20-item questionnaire with a 4-point scale (range 0–3) to rate the frequency of depressive symptoms during the past week. The total score is based on the sum of the item responses and ranges from 0 to 60. Higher scores indicate greater impairment with respect to depression. Totals of 16 or higher are considered in the 'clinical' range, with scores of 27 or more indicative of major depression (Ensel 1986; Zich et al. 1990). The coefficient alpha for the CES-D is high, ranging from 0.80 to 0.90, and test-retest reliability ranges from 0.40 to 0.70 (Radloff 1977; Devins et al. 1988). Internal consistency was also high in this sample (Cronbach's $\alpha = 0.94$; inter-item correlation = 0.44).

Anxiety. The Beck Anxiety Inventory (BAI; Beck & Steer 1993) was used to measure self-reported anxiety. Internal consistency and test-retest reliability for this measure are high (Beck et al. 1988). Consistent with the literature, internal consistency was also high in this sample (Cronbach's $\alpha = 0.93$; inter-item correlation = 0.39). The scale comprises 21 descriptions of anxiety symptoms that are rated on a 4-point scale. Item scores are summed to obtain a total score ranging from 0 to 63. The BAI is designed to minimize overlap between depression and anxiety. A score of 16 represents the threshold for clinical significance (Leyfer et al. 2006).

Relationship capacity

Perceived social support. The Perceived Social Support from friends (PSS-fr) and from family (PSS-fa) scales were used. Both scales demonstrate high construct validity and test-retest reliability (Cronbach's $\alpha = 0.88$ for PSS-Fr, and 0.90 for PSS-Fa; Procidano & Heller 1983) as in this sample (PSS-fr: Cronbach's $\alpha = 0.90$; inter-item correlation = 0.31; PSS-fa: Cronbach's $\alpha = 0.93$; inter-item correlation = 0.40). Each scale comprises 20-items, rated as a (1) if support is perceived or (0) if support is not perceived.

Maternal attachment security

The Adult Attachment Scale (AAS) comprises 21 items measuring three underlying factors interpreted as the capacity to be close to others, the capacity to depend on others, and anxiety over relationships (Collins & Read 1990). Each item is rated on a 5-point Likert scale from (1) not at all like me to (5) very characteristic of me. Test-retest reliability for the scale and internal consistency for each of the subscales have been established (Collins & Read 1990; Collins 1996). In this sample, consistency estimates for the close, depend, and anxiety subscales respectively were: cronbach's $\alpha = 0.79$; inter-item correlation = 0.39; Cronbach's $\alpha = 0.72$; inter-item correlation = 0.30; Cronbach's $\alpha = 0.83$; inter-item correlation = 0.45). Subscale scores were combined arithmetically (Attachment + Close – Anxiety) to yield a second-order, continuous total attachment security score with a range from 0 to 15, with higher scores indicating greater attachment security. This attachment index was correlated with individual AAS subscales (Close, $r = 0.79$; Depend, $r = 0.79$; and Anxiety, $r = -0.84$). Significant correlations of the attachment index with individual AAS scales and high predictive validity to relational functioning, ego strength, and therapeutic alliance have previously been demonstrated (Goldman & Anderson 2007).

Data analysis

To test our main hypothesis that the RFI would produce greater improvements on the outcome measures than SIT, repeated-measures ANOVAs were conducted to test for a time (T1 vs. T2) by intervention (RFI vs. SIT) interaction on the group differences. Where the overall model was not significant, paired-samples *t*-Tests were carried out based on *a priori* predictions to examine change across time for women in each of the intervention groups. For the addiction severity and mental health measures with clinically relevant cut-scores, chi-square analyses were also carried out to compare degree of clinical change between intervention groups.

In regards to our secondary aim of testing relationship capacity as a mechanism of change, we carried out a hierarchical linear regression analysis to examine the association between change (T2-T1) in relationship capacity and addiction severity at T2, after controlling for addiction severity at T1, as well as changes in abstinence self-efficacy and mental health functioning.

Results

Data on all measures were not available for all participants. As a result, the total sample size varies by analysis (as indicated by the degrees of freedom for each analysis).

First, demographic data and baseline outcome scores were compared between intervention groups using an ANOVA. Only two significant differences were found between interventions ($p < 0.05$; see Table 2): a greater number of mothers in the RFI were unemployed and fewer self-identified as Caucasian compared to the SIT group. Associations between these potential covariates (employment status and ethnicity) and T1 and T2 outcome data for each measure were examined. Employment status was associated with perceived social support from friends at T2; therefore, it was included as a covariate. Analyses were also run with service duration included as a covariate and controlling for baseline (T1). A similar pattern of results was obtained regardless of whether these covariates were included or not. For ease of interpretation, results are presented based on the models excluding these covariates.

Addiction severity outcomes

Addiction severity

Results of the repeated-measures analysis did not reveal a significant time X group interaction effect. There was a significant main effect of time indicating that average

addiction severity decreased significantly from T1 to T2 across both intervention groups, $F(1,77) = 23.87$, $p < 0.01$. Paired-samples *t*-tests indicated that change across time was significant for women in both interventions, RFI: $t(54) = 3.9$, $p < 0.01$, Cohen's $d = 0.53$, and SIT: $t(23) = 3.21$, $p < 0.01$, Cohen's $d = 0.65$ (Figure 1).

For both intervention groups, average addiction severity scores were in the clinical range at T1 and in the nonclinical range at T2. A chi-square analysis restricted to women who were in the clinical range at T1 did not reveal a significant association between intervention type and shift from the clinical to nonclinical range, $\chi^2(1, 51) = 1.43$, n.s., with 67.6% (5/37) of women receiving RFI and 50.0% (7/14) of women receiving SIT moving into the nonclinical range.

Abstinence self-efficacy

Results of the repeated-measures analysis did not reveal a significant time X group interaction effect. There was a significant main effect of time, with abstinence self-efficacy increasing from T1 to T2 for women in both interventions, $F(1,77) = 4.50$, $p = 0.05$. Paired-samples *t*-tests indicated that the main effect of time was driven by a significant increase in average self-efficacy for women receiving RFI, $t(56) = 2.75$, $p < 0.05$, Cohen's $d = 0.36$, but not SIT, $t(23) = 0.76$, n.s., Cohen's $d = 0.16$ (Figure 1).

At T1, average self-efficacy scores were in the clinical range for both groups of women. At T2, the average self-efficacy scores for women receiving RFI were in the nonclinical range, whereas these scores remained in the clinical range for women receiving SIT. A chi-square analysis restricted to women who did not indicate high levels of self-efficacy at T1 ($< 80\%$) revealed a significant association between intervention type and shift in category, such that the majority (80.6%; 25/31) of the women receiving RFI had moved into the high self-efficacy range at T2, compared to only half (50.0%; 6/12) of the women receiving SIT, $\chi^2(1, 43) = 4.04$, $p = 0.04$.

Mental health

Depression. The repeated-measures analysis did not reveal a significant time X group interaction effect. There was a significant main effect of intervention indicating that average depression scores differed between the two intervention groups regardless of time point, with lower depression scores for women receiving RFI than those receiving SIT $F(1,82) = 4.15$, $p < 0.05$. Two post-hoc ANOVAs were conducted to examine the difference in average depression scores between the two intervention groups at T1 and separately, at T2. Findings indicated

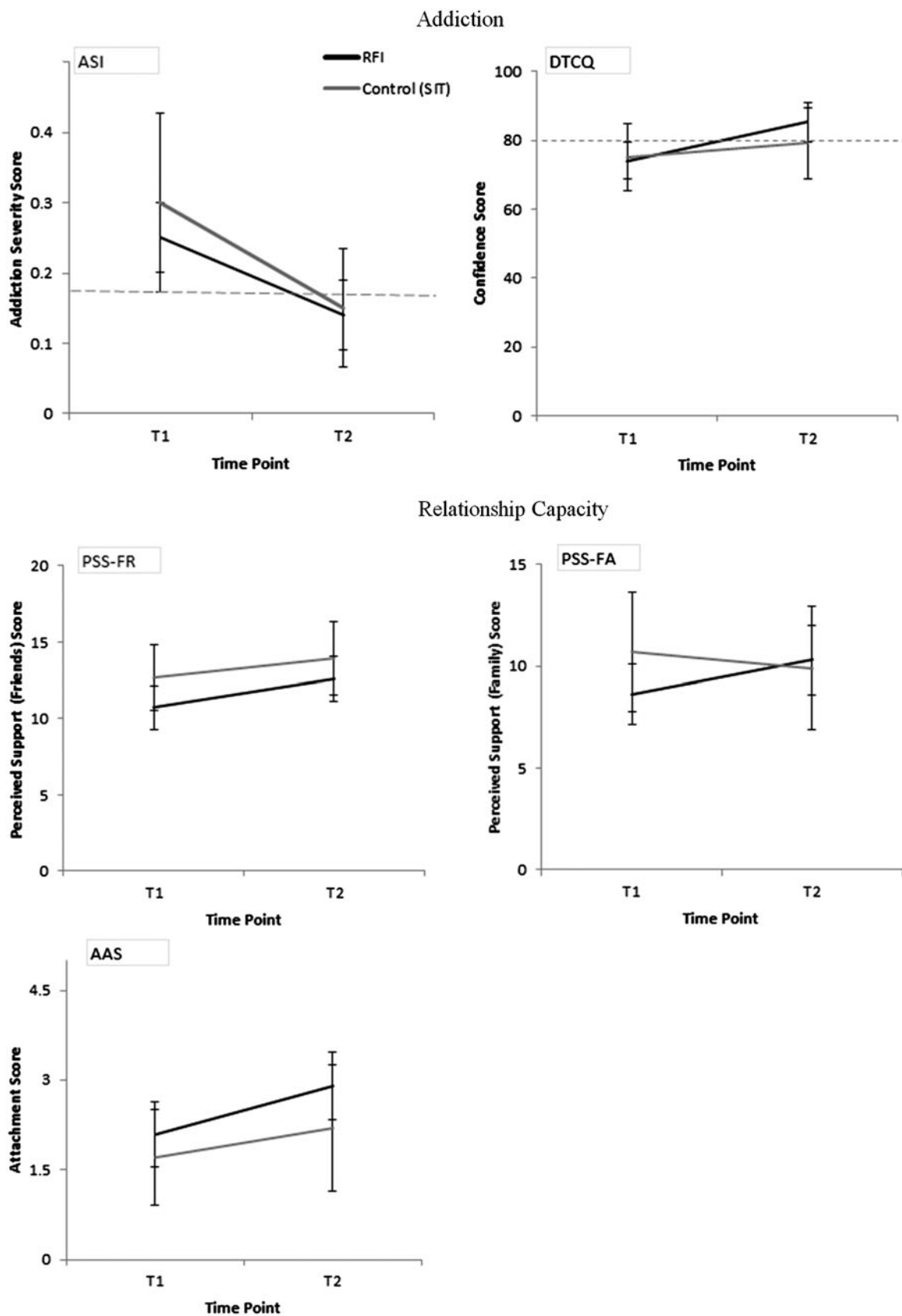


Figure 1. A comparison of outcomes by intervention type in the addiction and relationship capacity domains.

that the difference between interventions was significant at T2, $F(1,86) = 4.35$, $p < 0.05$, Cohen's $d = 0.14$, but not at T1, $F(1, 85) = 1.82$, ns, Cohen's $d = 0.08$.

At T1, over half of the women ($45/84 = 53.6\%$) reported clinically significant levels of depression including 32 women receiving RFI and 14 women receiving SIT. At T1, the average depression scores for both groups were in the clinical range. At T2, the average score fell just below the clinical range for women receiving RFI, whereas the average score remained well within the clinical range for women receiving SIT. A chi-square analysis restricted to women who were in the clinical range at T1 revealed a significant association between intervention type and shift in status from clinical to nonclinical, $\chi^2(1, 45) = 11.21$, $p < 0.01$, such that over half (51.6% ; $16/31$) of the women receiving RFI had moved into the nonclinical range by T2, compared to none of the women receiving SIT ($0/14$).

Anxiety. Results of the repeated-measures analysis did not reveal a significant time X group interaction effect. There was a significant main effect of intervention indicating that average anxiety scores differed between the two groups, with lower anxiety scores for women receiving RFI, $F(1,82) = 4.56$, $p < 0.05$. Two post-hoc ANOVAs were conducted to examine differences in average anxiety scores between the groups at each time point. The difference between interventions did not reach statistical significance at either time point: T1: $F(1, 86) = 3.44$, n.s., Cohen's $d = 0.15$ and T2: $F(1, 85) = 3.78$, n.s., Cohen's $d = 0.13$.

At T1, almost half of the women ($34/84 = 40.5\%$) reported clinically significant levels of anxiety, including 21 women receiving RFI and 13 women receiving SIT. A chi-square analysis restricted to women who were in the clinical range at T1 revealed a significant association between intervention type and shift from clinical to nonclinical range, $\chi^2(1, 45) = 3.78$, $p = 0.05$. Over half (57.1% ; $12/21$) of the women receiving RFI had moved into the nonclinical range by T2, compared to less than a quarter (23.1% ; $3/13$) of the women receiving SIT.

Relationship capacity

Perceived social support from friends. The repeated-measures analysis did not reveal a significant time X group interaction effect. There was a marginally significant main effect of time with both groups of women perceiving increased support across time, $F(1,87) = 3.49$, $p = 0.07$. Paired-samples t -tests indicated that the increase in perceived social support from friends

across time was significant for women receiving RFI, $t(65) = 2.05$, $p < 0.05$, Cohen's $d = 0.25$, but not SIT, $t(24) = 1.03$, n.s., Cohen's $d = 0.21$ (see Figure 1).

Perceived social support from family. The repeated-measures analysis revealed a marginally significant time X group interaction effect, $F(1,86) = 3.55$, $p = 0.06$. While average support from family increased for women receiving RFI, average support from family decreased for women receiving SIT. Results of the paired-samples t -tests indicated that the increase in perceived support was significant for women receiving RFI, $t(62) = 2.10$, $p < 0.05$, Cohen's $d = 0.26$, but not for women receiving SIT, $t(24) = 1.23$, n.s., Cohen's $d = 0.25$ (see Figure 1).

Attachment security. The repeated-measures analysis did not reveal a significant time X group interaction effect. There was a significant main effect of time with average attachment security increasing from T1 to T2 across intervention groups, $F(1,86) = 6.23$, $p < 0.05$. The paired-samples t -Tests indicated that this change across time in average attachment security was significant for women receiving RFI, $t(62) = 2.80$, $p < 0.01$, Cohen's $d = 0.35$, but not for those receiving SIT, $t(24) = 1.30$, n.s., Cohen's $d = 0.26$ (Figure 1).

Mechanisms of change

A hierarchical regression analysis (with forced entry) was carried out to explore the relative contributions of addiction severity at T1, as well as change from T1 to T2 in abstinence self-efficacy, mental health, and relationship capacity, to addiction severity at T2 (see Table 3). Addiction severity was entered into the equation first (model 1) and explained 12% of the variance in addiction severity at T2. Change in abstinence self-efficacy was added in the second step (model 2) and accounted for less than 1% of additional variance ($\Delta R^2 = 0.00$, $p = \text{ns}$). Variables entered in Models 2 and 3 (change in abstinence self-efficacy, depression, and anxiety) were not found to be unique and significant predictors of addiction severity. Finally, change scores for perceived support from friends, perceived support from family, and attachment security were entered in Step 4 to assess the additional contribution of change in relationship capacity (perceived support from friends and family, and attachment security) to addiction outcomes. The addition of these predictors produced a significant increment in R^2 ($\Delta R^2 = 0.10$, $p = 0.04$), and this effect was accounted for by change in attachment security. The final model with all predictors included (Model 4) accounted for 26% of the variance in addiction severity at T2.

Table 3. Summary of the hierarchical regression analysis for variables predicting addiction severity at T2 ($N = 70$).

Variable	Model 1			Model 2			Model 3			Model 4		
	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β
Constant	0.08	0.03		0.08	0.03		0.08	0.03		0.08	0.03	
Addiction severity (T1)	0.28	0.09	0.35**	0.29	0.10	0.36**	0.31	0.10	0.38**	0.32	0.09	0.39**
Δ Self-efficacy				0.00	0.00	-0.06	0.00	0.00	0.01	0.00	0.00	0.02
Δ Depression							0.00	0.00	0.08	-0.001	0.00	-0.07
Δ Anxiety							0.00	0.00	0.13	0.00	0.00	0.16
Δ Support (friends)										0.00	0.00	0.08
Δ Support (family)										-0.004	0.00	-0.13
Δ Attachment										-0.02	0.01	-0.29*
R^2		0.12			0.13			0.16			0.26	
<i>F</i> for Δ in R^2		9.52**			0.23			1.10			2.90*	
df for <i>F</i>		1,68			1,67			2,65			3,62	

Δ Self-efficacy = Mean Abstinence Self-efficacy T2 – Mean Abstinence Self-efficacy T1; Δ Depression = Mean Depression T2 – Mean Depression T1; Δ Anxiety = Mean Anxiety T2 – Mean Anxiety T1; Δ Support (friends) = Mean Perceived Social Support from Friends T2 – Mean Perceived Social Support from Friends T1; Δ Support (family) = Mean Perceived Social Support from Family T2 – Mean Perceived Social Support from Family T1; Δ Attachment = Mean Total Attachment T2 – Mean Total Attachment T1.

* $p < 0.05$, ** $p < 0.01$.

Discussion

The goal of this study was to compare two approaches to intervention for maternal substance use: a novel, relationship-focused approach offered at BTC, versus a standard integrated approach. The key question of interest was whether a relationship-focused intervention would produce greater improvements in addiction, relationship capacity, and mental health for mothers with substance use issues who have often experienced past trauma and poor attachments since childhood, and who require support identifying and forming healthy relationships.

We found that both interventions successfully supported the mothers in recovering from their addictions, but based on the number of women who were able to achieve high levels of self-efficacy, the RFI was particularly supportive in fostering maternal confidence to resist temptations to use in the future. A relationship focus also provided substantial benefit to mothers with significant mental health issues in reducing their symptoms of depression and anxiety. In addition, the RFI provided an advantage over the SIT in regards to relationship capacity by enhancing maternal perceptions of support from family. The development of relationship capacity, in turn, was associated with addiction recovery.

Addiction

Despite the extremely high-risk nature of this sample of women at intake, integrated intervention had a large effect on addiction severity over time for both groups (RFI: $d = 0.53$; SIT: $d = 0.65$; large effects: Cohen 1988), with addiction-related difficulties falling into the non-clinical range. In line with our prediction that RFI would produce greater gains in addiction severity than SIT, RFI

had a greater effect on abstinence self-efficacy than SIT (RFI: $d = 0.36$ = moderate effect size; $d = 0.16$ = small effect size). Consistent with previous research findings (Cummings et al. 2010), it seems that women who begin treatment with low levels of self-confidence to resist substance use (as was the case for both groups of women in this study) may be able to make significant gains in their recovery.

These findings add to a growing body of research demonstrating an advantage of integrated approaches to substance abuse intervention for women, over nonintegrated and mixed-gender approaches. In the integrated approach, the maternal role is considered (Ashley et al. 2003; Greenfield et al. 2007; Suchman et al. 2008, 2010, 2011; Milligan et al. 2010), and barriers of shame and guilt are addressed (Smith 2007; Marlatt & Witkiewitz 2010). These results also contribute evidence in support of calls for multifaceted, single-access interventions for substance using women and mothers (e.g. Connors et al. 2001; Niccols & Sword 2005).

Mental health

As expected, a higher percentage of women receiving RFI than women receiving SIT were able to shift from clinical to nonclinical levels of depression and anxiety after approximately one year of intervention. It is particularly significant that women receiving RFI demonstrated improvements in mental health functioning, while simultaneously reducing their addiction-related difficulties and reliance on substances to cope. These findings are consistent with a recent meta-analysis supporting the efficacy of integrated treatment for improving women's mental health (Milligan et al. 2010). They also emphasize the importance of a relational framework in assisting

women to recover from past trauma and associated mental health difficulties.

Relationship capacity

Whereas women receiving RFI reported increased feelings of social support and attachment security after one year of intervention (moderate effects: $d_s = 0.25$ & 0.35 , respectively), women receiving SIT reported a *decreased* perception of support in certain relationships that was also moderate in effect. ($d = 0.25$). Previous research has highlighted the critical role of supportive relationships in sustaining addiction-related gains after treatment (e.g. Cosden & Cortez-Ison 1999; Ellis et al. 2004; Trulsson & Hedin 2004). Although it may be difficult to enhance social networks through intervention (Tracy & Johnson 2007), studies have shown that *perceived* support is more important to treatment outcomes than actual support (Ellis et al. 2004). The findings of this study are particularly hopeful in this regard, showing that RFI not only increases perceptions of support but also improves women's perceptions of their capacity to be close to and depend on others (e.g. Suchman et al. 2010).

Considering the extensive trauma histories of these two groups of women, as well their relational and mental health difficulties at outset, it is particularly salient that despite these potential barriers to change, women who received RFI were able to make significant gains in their capacity for relationships, as indicated by the increases in their attachment security and perceived social support. These findings are consistent with attachment theory and literature suggesting that attachment security plays an important role in promoting positive interpersonal and mental health outcomes in substance-using populations (Thorberg & Lyers 2010).

Mechanisms of change

Although a large portion of the variance in addiction outcomes remained unexplained due to the complexity of factors underlying maternal substance use, increased maternal relationship capacity was associated with more positive addiction outcomes, over and above other established predictors of addiction severity including mental health functioning and perceived social support.

Taken together, these findings suggest that it is possible to produce improvements in maternal relationship capacity through a RFI and that such changes relate to improvements in maternal addiction outcomes. These findings are consistent with literature highlighting the importance of positive social networks and secure attachment relationships in supporting women to sustain gains made in the areas of addiction and mental health

after treatment for substance use (e.g. Falkin & Strauss 2003; Ellis et al. 2004; Trulsson & Hedin 2004; Staton-Tindall et al. 2007; Tracy & Johnson 2007; Suchman et al. 2008, 2010, 2011). Whereas addiction and trauma are typically considered essential targets of treatment, the findings of this study are unique in that they suggest a shift in focus towards maternal relationship capacity, broadly defined, in treatment for mothers who use substances.

Strengths and limitations

A number of limitations should be considered when interpreting the findings. First, this study was based on a fairly homogeneous sample of women with substance use issues in terms of ethnicity and risk status. As such, results may not generalize to the population of women with substance use issues and need to be replicated in other samples. Second, although trends were all in the expected directions, the interaction models of the repeated measures analyses were not supported in most cases, highlighting the need for a larger, more balanced sample to detect significant effects. It is important to note that when all T1 data were considered, average mental health scores were higher (indicative of poorer functioning) for women receiving RFI, than women receiving SIT. The opposite was true when T1 data for women missing T2 data were excluded. This suggests that the repeated measures analyses on mental health functioning represent conservative tests because women receiving RFI, with the poorest mental health functioning, tended to be missing T2 mental health data and were therefore excluded from the analyses.

Results of the *t*-test analyses did provide some support for our *a priori* predictions despite a conservative approach to testing using two-tailed significance values, rather than one-tailed, and a stringent control comparison. Although it is possible that group differences in employment status or ethnicity contributed to these effects, a similar pattern of results was obtained when these variables were included as covariates in the models. Moreover, the groups did not differ in terms of the average number of children women were parenting, so it is unlikely that differences in parenting motivation, for instance, can account for the findings. A randomized controlled trial of the interventions is ultimately needed to clearly associate group differences with intervention approach.

Notwithstanding these limitations, this study makes a significant contribution to a limited body of research comparing the relative efficacy of integrated to nonintegrated approaches to treatment for women with substance abuse issues (e.g. Milligan et al. 2010, 2011; Niccols

et al. 2010b). Given the relatively large sample obtained (cf. McComish et al. 2003; Knight et al. 2007; Suchman et al. 2008, 2010, 2011; Niccols et al. 2010b), this study fills a critical need in the extant literature for controlled research with larger sample sizes (Niccols et al. 2010b). Findings highlight that the manner in which 'integration' is defined is critical. The group of meta-analyses completed in this area has defined 'integration' quite broadly (Milligan et al. 2010, 2011; Niccols et al. 2010b). This study suggests that a more refined operationalization may be needed that distinguishes between programs offering basic parenting support and programs providing a specific focus on the maternal relationship through direct intervention (see Clausen et al. 2012 as an example). The findings of this study also suggest that an examination of relationship-focused service as a moderator of outcomes may be important to explore in future research. Extending the focus on maternal outcomes to include the impact of relationship-focused services on parenting and child development has received little attention thus far and is an area ripe for future exploration.

Conclusions

The findings of this study highlight the potential for relationship-focused intervention to effect broad improvements in maternal outcomes, not only in addiction but also in mental health and relationship functioning. Results indicate an important role for maternal relationship capacity in addiction outcomes, highlighting the importance of supporting women to form healthy relationships in general, and with their children in particular. When women with substance use issues receive services that meet both their individual and relationship needs in a supportive context, where they feel safe to disclose their health worries and parenting concerns without risk of censure, this once 'unreachable' population of high-risk mothers can be accessed and supported (Moore et al. 1998; Pepler et al. 2002).

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