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# Treatment of Friendship Problems in Children With Attention-Deficit/Hyperactivity Disorder: Initial Results From a Randomized Clinical Trial

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

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**Objective:** This study evaluated a novel intervention for friendship problems in children with attention-deficit/hyperactivity disorder (ADHD). Parental Friendship Coaching (PFC) teaches parents to coach their children in targeted friendship behaviors that are lacking in children with ADHD and that help children develop good quality friendships. **Method:** Participants were 172 families of children with ADHD and social impairment (ages 6–11; 29.7% female) at two Canadian sites, randomized to PFC or to an active comparison intervention (Coping with ADHD through Relationships and Education; CARE) to control for common therapy factors. Questionnaire and observational measures assessing primary outcomes of children's friendship quality and secondary outcomes of children's friendship behaviors were collected at baseline, posttreatment, and 8-month follow-up. **Results:** Across both treatment conditions, children showed improvements in positive friendship quality and in friendship behaviors. Relative to CARE, PFC was associated with somewhat more positive and less negative friendship behaviors at posttreatment and follow-up, but no difference between conditions was found in friendship quality. However, moderation analyses suggested that PFC may contribute to better friendship quality among families who had previous psychosocial treatment, as well as children with comorbid externalizing disorders. **Conclusions:** Although PFC showed some efficacy for affecting children's friendship behaviors, these changes may not translate into friendship quality. Nevertheless, PFC may improve friendship quality for at-risk subgroups of children with ADHD.

### What is the public health significance of this article?

The Parental Friendship Coaching intervention may improve children's friendship behaviors, and may improve friendship quality in some at-risk subgroups of children with ADHD.

**Keywords:** ADHD, friendship, intervention, Parental Friendship Coaching

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The social difficulties of children with attention-deficit/hyperactivity disorder (ADHD) are well documented (Gardner & Gerdes, 2015). Because peer rejection in this population has been difficult to change, some ADHD researchers have called for interventions that target friendship specifically (Hoza, Mrug, Pelham, Greiner, & Gnagy, 2003). This study tested the efficacy of a novel behavioral intervention, Parental Friendship Coaching (PFC), on improving friendship quality and friendship behaviors in elementary school-age children with ADHD.

### ADHD and Friendship Problems

Friendship is a mutual relationship between two children (Parker & Asher, 1993). Around 56% to 76% of elementary school-age children with ADHD have no reciprocated friendships in their classroom, compared with 10% to 32% of their peers (see Gardner & Gerdes, 2015). Friendships also vary in quality, or the provisions afforded to those involved. However, the friendships of children ages 7–13 with ADHD have more negative (e.g., conflict) and fewer positive features (e.g., warmth) compared with those of typically developing children (Normand et al., 2011). More concerning are findings that over 6 months, friendship quality worsened for the children with ADHD but improved for typically developing children (Normand et al., 2013).

Friendship in the elementary school years promotes adjustment in incremental and independent ways from peer acceptance (or being liked by the peer group; Bagwell, Schmidt, Newcomb, & Bukowski, 2001). For example, friendship has been found to provide a sense of companionship and to have more robust effects on children's self-esteem and social/emotional outcomes relative to acceptance, in children transitioning between Grades 5 and 6 (Kingery, Erdley, & Marshall, 2011). In a friendship, children also have the unique opportunity to develop social skills pertinent for close relationships, such as trust, perspective-taking, and negotiation (Bagwell et al., 2001). Nonetheless, the effect of a friendship on adjustment depends on its features. Whereas high-quality friendships marked by warmth, closeness, and trust generally confer benefits to children, a poor quality friendship may have no helpful effect, or even lead to maladjustment (Berndt, 2002). Studies with community samples of elementary school-age children find that positive friendship quality predicts children's lower loneliness and higher self-esteem, after accounting for the number of friends (Kingery et al., 2011), and among children with reciprocated best friends (Brendgen et al., 2013). Similarly, having a friendship in kindergarten with positive quality led to reduced internalizing and aggressive behaviors in the early school years, whereas a negative quality friendship resulted in increased problem behaviors, even relative to having no friendships at all (Engle, McElwain, & Lasky, 2011).

Regarding work in ADHD samples, among girls ages 6–12 with and without ADHD, having more reciprocated friends buffered against the associations between children's externalizing behavior and their peer victimization (Cardoos & Hinshaw, 2011). Children's reports of positive friendship quality (specifically, intimacy) in their self-perceived best friendship also mitigated the association between ADHD symptoms and social problems 1 year later among children ages 5–13 (Becker, Fite, Luebke, Stoppelbein, & Greening, 2013). Yet, in the Multimodal Treatment Study of Children with ADHD (MTA), number of friends in preadolescence

did not predict adjustment 4 years later, either after accounting for peer rejection or in interaction with rejection (Mrug et al., 2012). However, other than Becker et al. (2013), tests of the buffering effect of friendship in ADHD samples have not examined friendship quality. Indeed, as is found to be the case in community samples, variability in quality of friendships of MTA participants may have diluted the effect of friendship quantity.

Positive and negative friendship quality is conceptualized to be developed via positive and negative friendship behaviors, respectively. Relative to typically developing peers, children with ADHD ages 7–13 are observed to demonstrate more negative friendship behaviors, such as insensitivity to their friends' needs (Normand et al., 2019), bossiness (Normand et al., 2011), and excessive talking about themselves (Ronk, Hund, & Landau, 2011) in playdates with existing friends as well as with unfamiliar peers. Poor friendship behaviors on playdates (e.g., argumentativeness) in elementary school-age children with ADHD are confirmed by parent report (Frankel & Mintz, 2011). Importantly, among children ages 7–13 with and without ADHD, positive (e.g., prosocial) and negative (e.g., self-centered problem solving) friendship behaviors observed with friends predicted the dyad's friendship quality 6 months later (Normand et al., 2013). These findings underscore the potential utility of fostering good friendship behaviors, to the end goal of improving friendship quality in children with ADHD.

### Interventions for Friendship Problems in ADHD

To date, few interventions have focused on friendship in ADHD populations. Hoza et al. (2003) arranged a buddy intervention as part of the Summer Treatment Program. Children with ADHD in the program ( $n = 209$ , ages 5–12) were paired, and activities were designed to support the relationship. Positive friendship quality (specifically, companionship) in the dyad, as rated by children and counselors, was stronger for children whose parents fostered the friendship. However, the buddy intervention has never been evaluated relative to a comparison condition, and its effects cannot be separated from the effects of the entire Summer Treatment Program.

Another example is Children's Friendship Training (CFT), which includes 12 weeks of child groups that teach friendship behaviors and concurrent parent groups to help parents reinforce what their children are learning (Frankel, Myatt, Cantwell, & Feinberg, 1997). Children ages 6–12 receiving CFT ( $n = 35$  with ADHD and  $n = 14$  without ADHD) improved on parent- and teacher-report of friendship behaviors relative to a nonrandomly assigned comparison group on the waitlist for treatment ( $n = 12$  with ADHD and  $n = 12$  without ADHD; Frankel et al., 1997); friendship quality was not examined. In another study, 20 adolescents with ADHD who received an adaptation of CFT (the Program for the Evaluation and Enrichment of Relational Skills; PEERS) improved from baseline to posttreatment on self-reports of friendship behaviors and on self- and parent-reports of new friendships (Gardner, Gerdes, & Weinberger, 2019). However, no effects were found for the outcome of adolescent-reported friendship quality. This study contained no comparison group.

Finally, Wilkes-Gillan, Bundy, Cordier, Lincoln, and Chen (2016), in a 10-week program, taught positive friendship behaviors during in vivo play sessions to children ages 5–11 with ADHD and a typically developing playmate. Parents were encouraged to re-

inforce the skills that children were learning. Children who received the intervention ( $n = 15$ ) improved from baseline to post-treatment in observed friendship behaviors, but this was not seen for those randomized to a waitlist condition ( $n = 14$ ). Some improvements in friendship behaviors were maintained at a 1-month follow-up. However, whether the child with ADHD and the selected playmate were actually reciprocated friends was not confirmed, and friendship quality was not assessed.

These studies offer some suggestive evidence, albeit limited, that interventions can possibly improve friendship behaviors in children ages 5–12 with ADHD. However, existing studies are constrained by lack of randomly assigned control groups, small sample sizes, and no follow-up data. Further, they have either not assessed friendship quality in a way that can be tested as a result of intervention or there was no impact on this outcome. Therefore, our field is still in need of empirically supported interventions for friendship problems in ADHD.

### Parental Friendship Coaching

The PFC intervention teaches parents to coach their elementary school-age children in targeted friendship behaviors that are suggested to help children develop good friendship quality, and that are lacking in children with ADHD (e.g., Normand et al., 2011). Improving children's friendship behaviors is the proximal goal of PFC. However, friendship behaviors are theorized to result in friendship quality. Thus, improved friendship quality is the ultimate intervention goal because this may carry the greatest implications for adjustment (as indicated above).

PFC consists of only parent groups, with no child treatment component, because parents are considered the mechanism of change for children in this age group. PFC is based on the premise that parents are uniquely positioned to facilitate their children's friendships through playdates (Mikami & Normand, 2015), which are the real-world contexts in which friendships develop (Frankel & Mintz, 2011). Parents remain involved in the organizing and supervising of playdates throughout elementary school, or up to around age 12 (Frankel & Mintz, 2011). To set up a playdate, parents must network with other families and provide a positive impression of their child. Once a playdate is arranged, parents can give in vivo reminders and reinforcements to encourage children's good friendship behaviors during the playdate. Thus, parents have the ability to leverage personal connections to arrange playdates and to shape children's behavior in the heat of the moment in a real-world peer situation. Involving parents as friendship coaches may therefore address barriers found in clinic-based social skills training where children with ADHD fail to generalize learned skills outside of session (Evans, Owens, Wymbs, & Ray, 2018).

In a pilot study involving 62 families of children with ADHD (ages 6–10) randomized to PFC versus no treatment, parents in PFC reported their children to show better friendship behaviors at posttreatment (Mikami, Lerner, Griggs, McGrath, & Calhoun, 2010). Specifically, parents reported that children had less aggressive and argumentative behavior during playdates, and higher social skills, although this was not corroborated by teachers. No child demographics or comorbidities moderated treatment effects. The current study improved on the pilot by including assessments of friendship quality (in addition to friendship behaviors), observational and peer-report outcome measures, and follow-up data, in

a larger sample. Because common therapy factors may have influenced results in the pilot, herein we compared PFC to an active intervention created for parents of elementary school-age children, Coping with ADHD through Relationships and Education (CARE; Power et al., 2012). CARE offered psychoeducation about friendship issues and supported parents in reflecting on how this content applied to their children, and in giving one another advice about how to address the problems.

### The Current Study

We present a randomized trial comparing PFC with CARE on multimethod and multiinformant outcome measures of friendship in elementary school-age children with ADHD and social impairment. Friendship quality was our primary outcome because this was the ultimate goal of PFC. Our primary hypothesis was that children in PFC, relative to those in CARE, would show more positive and less negative friendship quality. Friendship behavior was our secondary outcome, which we viewed as the proximal goal of PFC that would result in friendship quality. Our secondary hypothesis was that children in PFC, relative to those in CARE, would show more positive and less negative friendship behaviors. Because the pilot of PFC found effects for parent reports of better friendship behaviors, we also sought to replicate this result in the current sample and with observational measures. We tested intervention effects at posttreatment and at a follow-up 8 months later. This allowed us to determine whether any potential effects for PFC occurred at both posttreatment and follow-up (representing maintained effects) or appeared at follow-up for the first time (representing sleeper effects). Finally, we explored the treatment moderators of age, gender, externalizing and internalizing comorbidities, medication status, and previous psychosocial treatment; we limited these tests to the primary outcomes.

### Method

#### Participants

Participants were 172 families of children with ADHD and social impairment (29.7% female; age 6–11). All children were in Grades K–6, which corresponds to elementary school in this sample. Each child took part in the study with one parent (92.4% mothers). Families were enrolled across two Canadian sites: Vancouver and Ottawa/Gatineau. At both sites, families were recruited through hospitals, clinics, and schools. See Table 1 for participant demographics.

#### Procedure

Figure 1 displays the Consolidated Standards of Reporting Trials (CONSORT) diagram. Parents gave consent and children assented to participate. Procedures were the same at both sites, but conducted in English in Vancouver and French in Ottawa/Gatineau, and were approved by institutional review boards at each site.

#### Determination of Study Eligibility

Parents and teachers rated the child on 18 ADHD symptoms on the Child Symptom Inventory 4 (CSI; Gadow & Sprafkin, 2002)

Table 1  
Baseline Demographic and Clinical Characteristics by Treatment Group

Characteristic	PFC ( <i>n</i> = 84)	CARE ( <i>n</i> = 88)	Total ( <i>n</i> = 172)	<i>p</i>
Child gender (male), <i>n</i>	62	59	121	.332
Ethnicity, <i>n</i>				.902
Caucasian/White	61	64	125	
Afro-Canadian/Black	1	0	1	
Asian-Canadian/Asian	5	5	10	
Hispanic/Latino	1	1	2	
Multiracial	16	16	32	
Decline to state	0	2	2	
Current ADHD medication, <i>n</i>	51	52	103	.828
Comorbid externalizing, <i>n</i>	23	32	55	.207
Comorbid internalizing, <i>n</i>	23	24	47	.987
Previous psychosocial intervention, <i>n</i>	53	51	104	.491
Child age (y), <i>M</i> ( <i>SD</i> )	8.74 (1.60)	8.35 (1.49)	8.54 (1.55)	.104
Full Scale IQ, <i>M</i> ( <i>SD</i> )	102.33 (15.1)	102.94 (15.4)	102.65 (15.2)	.794
Family income (CAD Annual), <i>M</i> ( <i>SD</i> )	118,614 (71,792)	112,162 (57,283)	115,326 (64,673)	.536
Parental education, <sup>a</sup> <i>M</i> ( <i>SD</i> )	5.29 (1.11)	5.22 (1.14)	5.26 (1.13)	.685
CSI: Inattentive—Parent, <i>M</i> ( <i>SD</i> )	7.33 (1.74)	7.69 (1.48)	7.52 (1.62)	.145
CSI: Hyperactive/Impulsive—Parent, <i>M</i> ( <i>SD</i> )	6.15 (2.60)	6.00 (2.51)	6.08 (2.55)	.691
CSI: Inattentive—Teacher, <i>M</i> ( <i>SD</i> )	5.66 (2.86)	5.98 (2.64)	5.82 (2.74)	.455
CSI: Hyperactive/Impulsive—Teacher, <i>M</i> ( <i>SD</i> )	4.30 (2.91)	4.44 (3.14)	4.37 (3.02)	.753
Inattentive—Total, <sup>b</sup> <i>M</i> ( <i>SD</i> )	7.96 (1.56)	8.15 (1.17)	8.06 (1.37)	.385
Hyperactive/Impulsive—Total, <sup>b</sup> <i>M</i> ( <i>SD</i> )	6.75 (2.23)	6.74 (2.37)	6.74 (2.30)	.974
SDQ: Peer Problems—Parent, <i>M</i> ( <i>SD</i> )	5.53 (1.74)	5.55 (2.11)	5.54 (1.93)	.942
SDQ: Peer Problems—Teacher, <i>M</i> ( <i>SD</i> )	4.49 (1.89)	5.05 (1.88)	4.78 (1.90)	.057

Note. ADHD = attention-deficit/hyperactivity disorder; CARE = Coping with ADHD through Relationships and Education; CSI = Child Symptom Inventory 4; PFC = Parental Friendship Coaching; SDQ = Strengths and Difficulties Questionnaire. *p* values represent differences between PFC and CARE. Vancouver site children were more likely to have a comorbid externalizing disorder ( $M_{Vancouver} = 41\%$ ,  $M_{Ottawa/Gatineau} = 24\%$ ) but less likely to be White ( $M_{Vancouver} = 66\%$ ,  $M_{Ottawa/Gatineau} = 80\%$ ) or medicated ( $M_{Vancouver} = 50\%$ ,  $M_{Ottawa/Gatineau} = 69\%$ ).

<sup>a</sup> 1 = eighth grade or less, 2 = some high school, 3 = high school graduate, 4 = some college/university, 5 = college or technical degree, 6 = university graduate, 7 = advanced postuniversity degree. <sup>b</sup> Total subtype symptoms represents the number of symptoms endorsed by either parent report on a diagnostic interview and/or teacher report on the CSI.

by phone or e-mail. If the child had  $\geq$  four symptoms of inattention and/or four symptoms of hyperactivity/impulsivity endorsed by both parent and teacher as *often* or *very often*, we invited the family for a lab visit. For 16 children (9.3%), all of whom had existing diagnoses of ADHD made by a professional, we relied solely on parent report on the CSI because the child was medicated at school ( $n = 13$ ), or in a follow-up phone call, the parent endorsed symptoms at school and expressed that the teacher was not an appropriate informant for the child's symptoms (e.g., teacher is a substitute;  $n = 3$ ). At the lab visit, we administered the Kiddie-Schedule for Affective Disorders and Schizophrenia (K-SADS; Axelson, Birmaher, Zelazny, Kaufman, & Gill, 2009) to the parent. To meet final inclusion criteria, all children had  $\geq$  six items of either inattention and/or hyperactivity/impulsivity, where a symptom was endorsed by either the parent on the K-SADS or the teacher on the CSI using the "or" algorithm (Lahey et al., 1994).

Because the PFC intervention targeted friendship, children also needed to receive a score of  $\geq 3$  (corresponding to  $\geq 1SD$  above the mean) on parent and teacher reports on the Strengths and Difficulties Questionnaire Peer Problems subscale (SDQ; Goodman, 1997). For 23 children (13.4%), either the parent or teacher did not rate a 3; however, the parent recommended trusting the teacher (when the teacher reported more problems than the parent), or the

parent explained why peer problems were not noticed by the teacher (e.g., the child is anxious at school). All parents and teachers rated at least a 1 or a 2 (indicating some problems), and all children received  $\geq 3$  when using the "or" algorithm.

Exclusion criteria were estimated Full Scale IQ  $< 75$  on the Wechsler Abbreviated Scale of Intelligence (Wechsler, 1999) or the short form of the Wechsler Intelligence Scale for Children-IV (Wechsler, 2003), Autism Spectrum Disorder, psychosis, or active suicidality. Comorbid Oppositional Defiant Disorder (ODD), Conduct Disorder (CD), and depressive/anxiety disorders were permitted. We diagnosed comorbidities if children had parental endorsement of full criteria for the disorder in clinical interview, and an indication of elevated symptoms from another informant; this procedure ensured that symptoms were not confined to one setting (which is considered "mild" for ODD/CD). Children had an externalizing disorder if the parent endorsed ODD or CD on the K-SADS and teacher ratings corresponded to a *T* score  $\geq 60$  on the Oppositional Defiant Problems and/or Conduct Problems DSM scales on the Teacher Report Form (TRF; Achenbach & Rescorla, 2001). Children had an internalizing disorder if the parent endorsed a depressive or anxiety disorder on the K-SADS, and either (a) teacher ratings were a *T* score  $\geq 60$  on the Depressive Problems and/or Anxiety Problems DSM scales on the TRF, or (b) children endorsed a *T* score  $\geq 60$  on the Children's Depression Inventory-2

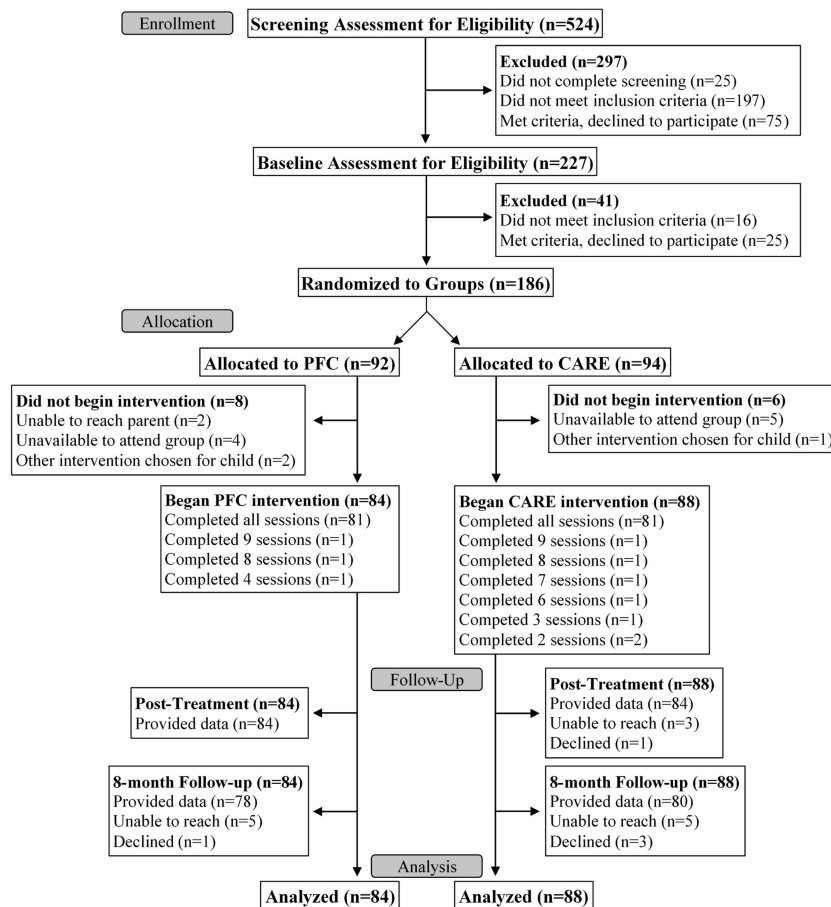


Figure 1. Consolidated Standards of Reporting Trials (CONSORT) diagram.

(Kovacs, 2010) and/or on the Multidimensional Anxiety Scale for Children-2 (March, 2012).

Psychotropic medication for ADHD was taken by 103 children (59.9%) and was not an exclusionary criterion provided that parents reported their child was on a stable dose and did not anticipate medication changes during the study interventions. Concurrent behavioral treatment, or psychosocial interventions for child social problems, were exclusionary.

### Baseline Assessment

At the lab visit, we administered the K-SADS to parents and conducted intelligence testing with children. Parents and children completed questionnaires, including parent-reported measures of the child's friendship behaviors. Teachers completed measures about the child's behaviors by mail. If children were eligible for the study after the lab visit, we asked the family to return with the child's closest friend. The child and friend independently reported whether they were "best friends," "close friends," "just ok friends," "occasional companions," or "strangers." Because scholars have argued that friendship is too often considered dichotomously ("best of friends" vs. "not friends at all"), we increased representativeness and limited ceiling effects by including the dyads where both children mutually endorsed being at least "just

ok friends" (Berndt & McCandless, 2009). This resulted in 149 children (86.6%) with reciprocated friends (and another two children brought nonreciprocated friends). Among these, both children reported the other as a best or close friend in 126 dyads (84.6%). The child, friend, parent, and parent of the friend completed questionnaires about the quality of the friendship. After this, the child and friend engaged in two tasks (described in Measures). Assessments were conducted by a postdoctoral fellow, graduate students in clinical psychology or selected study coordinators at the BA level, and undergraduate research assistants (who administered child assessments only).

### Intervention Provision

After enough families were enrolled at one site to form a cohort (about 12–14), we randomized each family to either a PFC group or a CARE group (using computerized software that was created for the project by a research center not connected with the study team), and began intervention delivery for these families. This process occurred 14 times, so that there were 28 unique groups (14 PFC and 14 CARE, equally distributed across sites). Both PFC and CARE consisted of 10, 90-min parent group sessions that met once weekly, typically with six to seven families. Each condition had an associated manual that detailed the content in each session.

Treatment groups were led by a clinician with a Ph.D. in clinical psychology, assisted by a graduate student in clinical psychology, who were part of the study team. To control for therapist effects, the same lead clinician always conducted both the PFC and the CARE group within a cohort. Whenever feasible, coclinicians helped with both a PFC and a CARE group. Across the 28 groups, there were 6 different lead clinicians and 15 different coclinicians. The Principal Investigators, both of whom are licensed clinical psychologists, provided weekly supervision to lead and coclinicians at their site for 1 hr per intervention condition, to discuss the previous week's session and to plan for the next week's content. Principal Investigators also watched 100% of session tapes at their site.

The groups were held at a time and location of the parents' choice (options were a community site or the university). To reduce barriers to participation, during groups we offered childcare, parking, and snacks (all at no cost to participants) and make-up sessions when parents could not attend. The parent who enrolled in the study with the child was asked to attend all groups and complete all measures, but a coparent could attend too if desired. Coparents from 55 families attended at least one group session, with no differences between PFC versus CARE.

### Posttreatment Assessment

We followed an intent-to-treat model and attempted to collect data from all 172 families who began treatment. Questionnaires completed by parents, children, and teachers were obtained from 168 families (97.7%). We asked families to return to the lab with whoever was the child's closest friend at the current time, which could be a friend who had come before (69.9%) or a new friend (30.1%). This is because parents in PFC had the option of strengthening an existing friendship or establishing a new friendship for their child. The likelihood of bringing a friend who had come before versus a new friend did not differ between PFC and CARE. At this timepoint, 143 families (83.1%) brought reciprocated friends and six (3.5%) brought nonreciprocated friends. Children and friends repeated the measures that they did at baseline.

### Follow-Up Assessment

Eight months after the conclusion of treatment, we invited all 172 families back in a similar procedure as posttreatment. We obtained questionnaire data from 158 families (91.9%). In addition, 113 (65.7%) brought a reciprocated friend of the child whereas four (2.3%) brought a nonreciprocated friend (using the same confirmation procedure as before). Again, we asked for the closest friend of the child at the time, and 61.9% were friends who had come at a previous visit while 38.1% were new friends. This proportion was no different in PFC versus CARE.

### The Parental Friendship Coaching Condition

PFC encouraged parents to (a) establish a positive parent-child relationship so that children are receptive to parental feedback; (b) coach children to display skilled friendship behaviors known to be lacking in children with ADHD; and (c) facilitate opportunities for children to demonstrate and practice good friendship behaviors by networking with other parents and arranging playdates (Mikami et

al., 2010). Topics are listed in Table 2. Each session covered specific skills where clinicians led a didactic portion explaining the skills, role-play practice, an activity where parents created a plan to enact the skills, and homework to try the skills at home.

The content was clinician-driven, and clinicians provided directive suggestions. Although PFC was manualized in terms of topics, clinicians encouraged parents to tailor the strategies to their child's unique needs and developmental level. For example, parents were told that older children may be embarrassed by overt corrections of their negative friendship behaviors during a playdate, so parents might instead use a secret signal, or call the child to another room (under the pretense of needing help) before issuing a private correction. Clinicians also recommended that parents engage in PFC strategies at the beginning stages of a friendship, but explained that it is not necessary or realistic for parents to continue the same level of involvement forever. Once good friendship quality is established, this should foster better friendship behaviors in the child with ADHD, and the friendship should become more resilient to children's occasional behavior problems.

### The Coping With ADHD Through Relationships and Education Condition

CARE offered psychoeducation and an environment where parents received advice and support from other families who have lived experience with ADHD (Power et al., 2012). As shown in Table 2, CARE covered topics such as comorbidities, medication options, and educational rights. We tailored CARE to address friendship issues (e.g., how comorbidities affect friendship, whether medication improves friendship, friendship goals in individualized education plans). The clinicians provided information and encouraged parents to discuss the issues they have faced and to share recommendations and resources with one another. CARE clinicians did not provide any skills training around strategies to improve children's friendship behaviors (as in PFC).

### Treatment Fidelity

First, to assess adherence, 10% of sessions were randomly selected and independent coders watched the full videotape of these sessions. Coders scored the implementation of the PFC manual components in PFC sessions, and the CARE manual components in the CARE sessions. Each component was scored as 0 = *not implemented*; 1 = *partially implemented*; 2 = *fully implemented*. Adherence to the manualized content was high (PFC:  $M = 1.94$ ,  $SD = 0.13$ ; CARE:  $M = 1.90$ ,  $SD = 0.16$ ), and this was not different between treatment conditions.

Second, to assess differentiation, a 5-min clip was randomly selected from every session and coders noted the duration of time (e.g., 30 s of the 5 min) that clinicians provided skills teaching, problem solving, and evaluative feedback about strategies to address peer problems. Coders then rated the social support parents gave to one another (0 = *lowest support*; 6 = *highest support*). These codes were assessed in both PFC and CARE. All videos were double coded, and intraclass correlation coefficients (ICCs) to assess interrater reliability were acceptable,  $ICC(2,k) = .80-.93$ . As expected, PFC clinicians initiated significantly more skills teaching (PFC:  $M = 2.27$ ,  $SD = 2.42$ ; CARE:  $M = 0.08$ ,  $SD = 0.59$ ), problem solving (PFC:  $M = 0.26$ ,  $SD = 0.48$ ; CARE:  $M =$

Table 2  
*Session Content of PFC and CARE Interventions*

Session	PFC	CARE
1	Becoming aware of your child's friendship; Introducing model that parents affect children's friendships; Building parent-child relationship by using special time	Understanding what ADHD is and how it impacts your child's behaviors with peers; Identifying problem social behaviors; Gaining empathy for your child's social problems
2	Building parent-child relationship by using active listening when discussing your child's social concerns; Giving constructive praise about social behaviors	Learning about the most common conditions that co-occur with ADHD and how they are diagnosed; Understanding how comorbidities affect your child's peer relationships
3	Giving constructive corrective feedback about social behaviors; Choosing a potential friend for a playdate	Understanding how your child's ADHD symptoms and social issues are likely to manifest over the lifespan
4	Handling your child's defiance to parent's guidance about appropriate social conduct; Preparing for a playdate as a host (preventing boredom); Inviting a peer for a playdate	Understanding the academic challenges faced by your child, the reasons for these problems, and their relation to social behavior and peers' perceptions at school
5	Teaching your child good dyadic play skills; Preparing for a playdate as a host (preventing conflict)	Understanding school rights and accommodations for children with ADHD, and their relation to peer problems
6	Troubleshooting playdate challenges; Teaching good conversation skills; Intervening in the playdate when efforts to prevent boredom and conflict have failed	Identifying the similarities and differences in how your child socially relates to different peers and adults; identifying the patterns for your child that facilitate good relationships
7	Teaching your child how to deal with negative emotion; Debriefing with your child after the playdate as a host	Understanding medication and psychosocial treatment, and their effects on social behavior
8	Preparing for a playdate as a guest; Debriefing with your child after the playdate as a guest	Understanding complementary and alternative medicine treatment, and their effects on social behavior
9	Assisting your child in meeting new potential friends; Learning to network with other parents	Learning how to assess your child's social problems and monitor related treatment response
10	Deciding whether to have another playdate; Understanding another family's response to playdate; Recap of skills taught; Reasons for backsliding; Planning for the future	Recognizing the roles of the multiple professionals in your child's life and how to facilitate communication between the various professionals treating your child's social problems

*Note.* ADHD = attention-deficit/hyperactivity disorder; CARE = Coping with ADHD through Relationships and Education; PFC = Parental Friendship Coaching. Additional details are available from the first author.

0.05,  $SD = 0.21$ ), and evaluative feedback (PFC:  $M = 0.57$ ,  $SD = 0.78$ ; CARE:  $M = 0.06$ ,  $SD = 0.24$ ) about peer problems, indicating little contamination in therapy process from PFC to CARE. Social support in the groups was equivalent (PFC:  $M = 2.65$ ,  $SD = 0.91$ ; CARE:  $M = 2.67$ ,  $SD = 0.84$ ), as clinicians encouraged this in each condition.

Third, exposure was measured by attendance. All sessions were received by 96% of PFC and 92% of CARE families (see Figure 1). This rate was not different between PFC and CARE.

Fourth, to assess responsiveness, parents rated their satisfaction after every session (1 = *not at all*; 7 = *very much*). After the third session, parents completed measures of alliance with the clinicians (Working Alliance Inventory Short Form-Bond Subscale; Hatcher & Gillaspay, 2006) and of treatment credibility/expectancy (Credibility and Expectancy Questionnaire; Devilly & Borkovec, 2000). Internal consistency in our sample was .82 for both measures. Alliance was high and equivalent across treatment conditions (scale range 0–28; PFC:  $M = 24.16$ ,  $SD = 3.09$ ; CARE:  $M = 23.17$ ,  $SD = 3.83$ ). Credibility/expectancy was significantly higher in PFC than in CARE (scale range 0–54; PFC:  $M = 44.46$ ,  $SD = 5.60$ ; CARE:  $M = 40.01$ ,  $SD = 8.16$ ), as were satisfaction ratings (scale range 1–7; PFC:  $M = 6.37$ ,  $SD = 0.49$ ; CARE:  $M = 6.11$ ,  $SD = 0.57$ ). However, parents found both treatments to be credible and satisfactory.

## Measures

### Friendship quality on questionnaires (primary outcome).

The parent, child, friend, and parent of the friend each independently completed the Friendship Quality Questionnaire—Short (FQQ-S; Glick & Rose, 2011) about the relationship between the child and friend. The FQQ (Parker & Asher, 1993) is a widely used and psychometrically sound measure. The short version has 22 items, each scored on a 5-point metric (0 = *not at all true*; 4 = *really true*), that load onto six subscales. As is standard practice (Berndt & McCandless, 2009), the validation and caring, companionship and recreation, conflict resolution, intimate exchange, and helping subscales were averaged to represent positive friendship quality, and the conflict and betrayal subscale represented negative friendship quality. Internal consistency in our sample for each informant was  $\alpha \geq .87$  for positive and  $\alpha \geq .75$  for negative friendship quality. Confirmatory factor analyses in the current sample found that a two-factor model (positive and negative friendship quality) with four indicators per factor (reports by the parent, child, friend, and parent of the friend) had good fit (Normand, Mikami, Savalei, & Guiet, 2020). Composite scores reflecting the mean of the four informants were created for positive and negative friendship quality. This procedure leveraged our multiple informant design while reducing the number of outcome measures.



**Friendship quality on observations (primary outcome).** At the lab visit, the child and friend engaged in two tasks, counter-balanced for order, and used in past research to assess friendship quality in ADHD samples (Normand et al., 2011). In the first (toy sharing), the dyad was presented with 15 toys and told to pick five they liked and to share them between each other. The second (car race) was a race to transport blocks using a toy car, but only one car could fit on the track at a time. Research assistants explained the tasks to the child and friend, and remained present to enforce task rules but did not intervene in the dyad's interactions. Independent coders, kept unaware of participants' treatment condition (and who were different from the treatment fidelity coders), later scored videos for friendship quality. To assess interrater reliability, we double coded a randomly selected  $\geq 20\%$  videos per outcome measure and calculated ICCs for continuous variables and kappas for dichotomous variables.

Positive friendship quality was measured by closeness and positive affect. Closeness,  $ICC(2,k) = .91$ , scored on a scale of 0–5, reflected the global affection, comfort, and warmth in the dyad. In line with past research (Normand et al., 2019), interval coding was used to denote children's affect at 5-s intervals as either positive, neutral, or negative ( $\kappa = .81$ ); only positive and negative affect were used in the current study. Positive affect reflected the proportion of 5-s intervals in which the child or friend displayed laughter, smiles, or jokes. We divided closeness by 5 to put the two variables on the same scale, and then calculated the mean of closeness and positive affect to create a composite score. Negative friendship quality was measured by reverse-coded cooperation and negative affect. Cooperation,  $ICC(2,k) = .91$ , scored on a scale of 0–5, reflected whether overall the dyad worked cooperatively (5) versus showed antagonism (0). Negative affect was the proportion of 5-s intervals in which the child or friend showed irritation, anger, or sadness. We divided reverse-coded cooperation by 5 and took the mean of reverse-coded cooperation and negative affect to create a composite score.

**Friendship behaviors on questionnaires (secondary outcome).** Parents reported on negative friendship behaviors using the Quality of Play Questionnaire (QPQ; Frankel & Mintz, 2011). This scale contains seven items on a 0–3 metric (0 = *not at all*; 3 = *very much*), assessing the aggressive, argumentative behaviors that children and friends showed during the most recent playdate. Internal consistency in our sample was  $\alpha = .85$ . The QPQ has been found to differentiate playdate behaviors between children with clinical disorders and typically developing children, and to correlate with behavioral observations (Frankel, Gorospe, Chang, & Sugar, 2011). An earlier two-subscale version of the QPQ (which has since been refined to one subscale) showed intervention effects for PFC in the pilot study (Mikami et al., 2010).

Parents also completed the normed and widely used Social Skills Improvement System (SSIS; Gresham & Elliott, 2008) to indicate positive friendship behaviors. Although the SSIS captures social skills that extend outside the playdate context, we wished to measure parental report of children's positive, skilled behaviors, as the QPQ only assesses negative behavior. Parent report on the SSIS showed responsiveness to PFC in the pilot (Mikami et al., 2010). Teachers also completed the SSIS to indicate children's positive friendship behaviors at school. Standard scores on the social skills subscale of the SSIS were used.

**Friendship behaviors on observations (secondary outcome).**

In the two tasks in the lab visit (described above), the same coders who assessed friendship quality tallied occurrences of friendship behaviors. Again, to assess interrater reliability, we randomly selected  $\geq 20\%$  of videos per outcome measure and double coded them. Reliability was measured by kappa for dichotomous variables. Coders tallied each occurrence of pro-social behavior in children and friends, defined as altruistic behaviors directed toward improving the other child's well-being (e.g., helping or sharing;  $\kappa = .73$ ). This was considered to be a positive friendship behavior. Coders also tallied each occurrence of aggressive behavior, defined as name-calling, shoving, or complaining about the other child ( $\kappa = .82$ ). Aggression indicated negative friendship behavior. Scores were converted into proportions to account for task duration. The average ICCs between the two children (representing the proportion of variance at the dyad level) across time-points for prosocial (.15) and aggressive behavior (.41) indicate that the behaviors of the child and friend were interrelated and nonindependent. As recommended in the literature (Kenny, Kashy, & Cook, 2006) and in line with past research (Normand et al., 2019), we considered prosocial and aggressive behaviors at the dyadic level, by using the means of the combined proportion scores of the child and friend.

## Moderators

At baseline, parents reported children's age, gender, and whether the child was taking medication for ADHD. Comorbid externalizing and internalizing disorders were determined as described above. Parents listed all psychosocial treatments the child or parent had received to address the child's ADHD. We considered every positive answer to indicate the presence of treatment; therefore, this variable reflected behavioral intervention, play therapy, counseling, and so forth.

## Data Analytic Plan

A priori calculations were conducted via simulations in R (Bates, Maechler, & Bolker, 2011) using the analytic plan proposed. In the pilot of PFC (Mikami et al., 2010), random effects were small (.00–.01, based on 12 groups at Level 2). The average effect size for PFC versus no treatment was medium for friendship behaviors, and friendship quality was not assessed in the pilot. Although we acknowledge the limitations of the pilot, we lacked a better source of data from which to derive estimations for the power analyses in the current study. Using the pilot study data as input for simulations, a target sample of 157 children nested in 28 treatment groups had power of 99% to detect a large effect ( $d = .8$ ), 88% to detect a medium effect ( $d = .5$ ), and 48% to detect a small effect ( $d = .3$ ) of treatment condition. Power for moderation was similar.

Most participants had complete questionnaire data (see Figure 1). A chi-square representing differences in the rate of missing data between PFC versus CARE at posttreatment, with a Yates correction for low expected frequencies, was not significant,  $\chi^2(df = 1) = 2.16, p = .141$ . A traditional Pearson chi-square test was appropriate at follow-up, and this also yielded a nonsignificant value between treatment conditions,  $\chi^2(df = 1) = 0.22, p = .641$ .

More data were missing on the measures that depended on children bringing reciprocated friends to the lab visit. Of the 30

analyses testing whether ability versus inability to bring a friend related to any behavioral or demographic variable at any timepoint, only one was significant. There were no differences between children with versus without reciprocated friends at either baseline or posttreatment on: all demographics, externalizing or internalizing comorbidity, medication status, previous psychosocial treatment, or on the QPQ and SSIS measures of friendship behaviors (which did not require a lab visit with a friend). At follow-up, children with versus without reciprocated friends did not differ on any variable with the exception that children with friends had lower ratings of negative friendship behaviors on the QPQ. Thus, children with friendship quality data that depend on a lab visit with a reciprocated friend, at follow-up, may overrepresent those with better friendship behavior. Treatment condition was not associated with children’s likelihood of bringing a reciprocated friend at any timepoint. We used full information maximum likelihood estimation to handle missing data in our analyses.

Reflecting random assignment, there were no group differences between PFC and CARE conditions in any demographic variable (see Table 1) or baseline measure of friendship quality or friendship behaviors (see Table 3). There were no differences between sites in measure psychometrics. Participants at the two sites did differ in some demographic variables (see Table 1) and in their group means on some primary and secondary outcomes (see Table 3). Therefore, we controlled for site in data analyses. We also checked for site by treatment condition interactions on the primary outcomes. One of eight possible interactions was significant: in Vancouver, PFC was more associated with lower negative friendship quality on questionnaires at posttreatment. Because this was not a consistent pattern, we did not consider it further. In addition, although there were six different lead clinicians, there were no treatment condition by clinician interaction effects on any primary outcome, either at posttreatment or follow-up.

On the treatment fidelity variables, the only site difference was that social support within the group was coded as higher in Vancouver than in Ottawa/Gatineau. There was one site by treatment condition interaction: the higher level of clinician-provided evaluative feedback in PFC versus CARE was more accentuated in Vancouver (although PFC > CARE at both sites). Both interventions appeared to be administered consistently across the sites overall.

**Primary Hypotheses**

Multilevel modeling was conducted using Mplus software (Muthén & Muthén, 2017) to account for the structure of the data with the 172 families (Level 1) nested in the 28 distinct intervention groups (Level 2). Models were estimated with robust standard errors (Raudenbush & Bryk, 2002); however, using nonrobust standard errors generated similar results. Outcome variables were positive and negative friendship quality on questionnaires, and positive and negative friendship quality on observations. We initially placed posttreatment and follow-up timepoints within the same model, but these models failed to converge. Therefore, we tested each outcome at posttreatment and at follow-up separately, for eight analyses in total.

At Level 1, we placed the outcome measure of friendship quality, with the same measure at baseline (group mean centered) as a predictor. Based on an unconditional model containing only

**Table 3**  
*Intervention Conditions and Friendship Outcomes*

Measure	PFC			CARE			Total		Treatment effect at PT			Treatment effect at F		
	BL	F	PT	BL	F	PT	BL	PT	B	SE	p	B	SE	p
Positive FQ questionnaires	2.42 (.442)	2.48 (.511)	2.48 (.503)	2.47 (.510)	2.58 (.506)	2.58 (.488)	2.45 (.477)	2.53 (.505)	2.53 (.499)	-.06	.07	-.08	.09	.332
Negative FQ questionnaires	0.69 (.411)	0.62 (.402)	0.70 (.460)	0.63 (.480)	0.64 (.410)	0.65 (.486)	0.66 (.447)	0.67 (.434)	0.64 (.447)	-.02	.07	-.03	.08	.756
Positive FQ observations	0.39 (.142)	0.43 (.135)	0.41 (.144)	0.42 (.145)	0.45 (.155)	0.45 (.154)	0.41 (.144)	0.43 (.150)	0.44 (.145)	-.03	.02	-.02	.03	.445
Negative FQ observations	0.18 (.133)	0.13 (.085)	0.18 (.115)	0.19 (.133)	0.20 (.128)	0.17 (.122)	0.18 (.132)	0.19 (.122)	0.15 (.107)	-.02	.03	-.04	.02	.894
QPQ parent report	4.93 (3.60)	2.81 (3.01)	2.31 (2.36)	5.08 (4.04)	3.69 (3.67)	2.94 (2.73)	5.01 (3.83)	3.02 (3.17)	2.88 (2.86)	-1.31	.45	-.04	.11	.44
SSIS parent report	76.00 (11.15)	83.04 (12.76)	82.68 (11.33)	73.86 (11.55)	77.72 (10.94)	78.80 (13.17)	74.89 (11.37)	80.10 (11.37)	80.85 (13.10)	4.91	1.47	4.58	2.01	.023
SSIS teacher report	82.86 (11.42)	88.29 (10.77)	85.44 (11.82)	81.45 (10.95)	84.41 (12.60)	86.97 (13.29)	82.15 (11.17)	84.92 (12.19)	87.64 (12.06)	1.43	2.03	-.481	-.21	1.56
Prosocial observations	0.04 (.019)	0.05 (.026)	0.04 (.022)	0.04 (.023)	0.04 (.020)	0.04 (.021)	0.04 (.021)	0.04 (.021)	0.04 (.024)	.01	.00	.051	.00	.969
Aggressive observations	0.02 (.013)	0.01 (.012)	0.02 (.015)	0.02 (.017)	0.02 (.026)	0.02 (.016)	0.02 (.015)	0.02 (.021)	0.01 (.014)	.00	.01	.665	-.01	.049

*Note.* All reported as *M* (*SD*). CARE = Coping with ADHD through Relationships and Education; PFC = Parental Friendship Coaching; BL = baseline; PT = posttreatment; F = follow-up; FQ = friendship quality; QPQ = Quality of Play Questionnaire; SSIS = Social Skills Informant System. PFC coded as 1, CARE coded as 0. At baseline, Vancouver children had lower scores on positive FQ (questionnaires and observations) and teacher SSIS, but lower negative FQ (observations) than Ottawa/Gatineau children. At posttreatment, Vancouver children had lower scores on positive FQ (questionnaires and observations), higher negative FQ (questionnaires), lower negative FQ and aggressive behavior (observations), higher QPQ, and lower parent and teacher SSIS than Ottawa/Gatineau children. At follow-up, Vancouver children had lower scores on positive FQ (questionnaires and observations), higher QPQ, and lower parent and teacher SSIS than Ottawa/Gatineau children. There were no effects of treatment condition on individual informants’ reports of FQ on questionnaires, except that parents of target children reported lower negative FQ at follow-up only (*p* = .049) in PFC relative to CARE.

the outcome variable and the same measure at baseline as a predictor, ICCs representing the proportion of variance at Level 2 ranged from .10 to .26 for the primary outcomes.

Next, to test our primary hypotheses, at Level 2, treatment condition (0 = CARE, 1 = PFC) was added as a predictor of the intercept of the outcome. Technically, site is a Level 3 variable, but because there were only two sites, we put site on Level 2 as a statistical control.

Level 1:

$$\text{Outcome measure} = \beta_{0j} + \beta_{1j}(\text{baseline measure}) + r_{ij}$$

Level 2:

$$\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{treatment condition}) + \gamma_{02}(\text{site}) + u_{0j}$$

$$\beta_{1j} = \gamma_{10}$$

As an indication of effect size in multilevel models, we calculated the incremental reduction of the Level 2 variance in the outcome measure associated with the addition of treatment condition, relative to a model with the same predictors (e.g., baseline measure, site) but without treatment condition (Rights & Cole, 2018). To give a sense of the clinical significance of the findings, we also reported the Cohen's *d* associated with the effect of treatment condition on the outcome variable (although this does not account for covariates and nesting). Conventions for *d* are 0.2 = *small*, 0.5 = *medium*, and 0.8 = *large* (Cohen, 1988).

## Secondary Hypotheses

We used the same model as we did for the primary hypotheses. We tested these outcomes representing friendship behaviors at posttreatment and at follow-up: parent-report of aggressive, argumentative behaviors on the QPQ; parent and teacher report of social skills on the SSIS; and observations of prosocial and aggressive behavior. ICCs representing the proportion of variance at Level 2, from an unconditional model containing only the outcome variable and the same measure at baseline as a predictor, ranged from <.01 to .25 for the secondary outcomes.

## Exploratory Analyses

We tested each moderator for the primary outcome variables only, to limit the analyses conducted. Significant interactions were interpreted by examining the direction of the coefficient of the moderator ( $\beta_{2j}$ ), and of the cross-level interaction ( $\gamma_{21}$ ). When  $\gamma_{21}$  and  $\beta_{2j}$  are in the same direction, this indicates that PFC (coded as 1) relative to CARE (coded as 0) magnifies the difference between children with versus without the moderator variable; when  $\gamma_{21}$  is in the opposite direction as  $\beta_{2j}$ , PFC mitigates these group differences.

Level 1:

$$\begin{aligned} \text{Outcome measure} = & \beta_{0j} + \beta_{1j}(\text{baseline measure}) \\ & + \beta_{2j}(\text{moderator}) + r_{ij} \end{aligned}$$

Level 2:

$$\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{treatment condition}) + \gamma_{02}(\text{site}) + u_{0j}$$

$$\beta_{1j} = \gamma_{10}$$

$$\beta_{2j} = \gamma_{20} + \gamma_{21}(\text{treatment condition}) + u_{0j}$$

## Results

### Descriptive Statistics

Outcome variables with outliers (0.7% to 1.7% of cases on each variable) were: negative friendship quality on observations and questionnaires, observed prosocial and aggressive behavior, and parent-reported argumentative behavior on the QPQ. We re-conducted analyses with outliers trimmed to exactly 3SDs from the mean and results were unchanged.

The same measure had moderate to strong bivariate correlations within the three timepoints (friendship quality:  $r_s = .33$  to  $.70$ ;  $p_s < .001$ ; friendship behaviors:  $r_s = .21$  to  $.77$ ;  $p_s = .031$  to  $.000$ ). Positive friendship quality on questionnaires had small correlations with positive ( $r_s = .18$  to  $.31$ ;  $p_s = .025$  to  $.001$ ) and negative friendship quality ( $r_s = -.13$  to  $-.35$ ;  $p_s = .121$  to  $.000$ ) on observations. Negative friendship quality on questionnaires had small or no correlations with positive ( $r_s = -.14$  to  $-.29$ ;  $p_s = .102$  to  $.002$ ) and negative friendship quality ( $r_s = .05$  to  $.15$ ;  $p_s > .05$ ) on observations. Small correlations existed between friendship behaviors as reported by different informants or methods ( $r_s = .01$  to  $.21$ ;  $p_s = .891$  to  $.032$ ).

### Patterns Across Treatment Condition

Table 3 shows that collapsing across treatment condition, children showed more positive friendship quality on questionnaires from baseline to posttreatment,  $t(135) = 2.91$ ;  $p = .004$ , and from baseline to follow-up,  $t(104) = 2.38$ ;  $p = .019$ . Similarly, more positive friendship quality on observations was evident from baseline to follow-up,  $t(103) = 2.31$ ;  $p = .023$ , but not from baseline to posttreatment. No effects were found for negative friendship quality.

With regard to friendship behaviors (see Table 3), collapsing across treatment condition, from baseline to posttreatment children showed less parent-reported negative behaviors on the QPQ,  $t(150) = -5.77$ ;  $p < .001$ , and more social skills on the SSIS on both parent report,  $t(153) = 6.62$ ;  $p < .001$  and teacher report,  $t(150) = 3.98$ ;  $p < .001$ . From baseline to follow-up, observations of aggressive behavior were lower,  $t(103) = -1.98$ ;  $p = .050$ , and parents reported less negative behaviors on the QPQ,  $t(135) = -6.03$ ;  $p < .001$  and higher social skills on the SSIS,  $t(145) = 6.36$ ;  $p < .001$ ; higher scores on the SSIS were corroborated by teachers,  $t(137) = 5.30$ ;  $p < .001$ . There were no effects for other friendship behaviors.

### Effects of Treatment Condition on Friendship Quality

Table 3 shows that receiving PFC versus CARE was not associated with either positive or negative friendship quality at posttreatment, or at follow-up, after statistical control of baseline friendship quality. This result was consistent across questionnaires and observations.

### Effects of Treatment Condition on Friendship Behaviors

These analyses are in Table 3. After accounting for baseline measures, at posttreatment, parents in the PFC condition reported

their children to have fewer aggressive, argumentative behaviors on playdates on the QPQ ( $B = -1.31, SE = 0.45; p = .004$ ). Parents, but not teachers, also reported children's higher social skills on the SSIS in PFC ( $B = 4.91, SE = 1.47; p = .001$ ). No significant differences were found between children in PFC versus CARE on observational measures, although we note a trend for children in PFC to show more pro-social behavior at posttreatment ( $B = 0.01, SE = 0.00; p = .051$ ). Treatment condition accounted for incremental reductions of 94%, 62%, and 46% of the Level 2 variance in QPQ, parent SSIS, and pro-social behavior at posttreatment, respectively. Cohen's  $d$  associated with the effect of PFC was  $-.43$  (95% CI  $[-.10, -.75]$ ) on the QPQ,  $.44$  (95% CI  $[.12, .76]$ ) on the SSIS, and  $.29$  (95% CI  $[-.05, .63]$ ) on prosocial behavior.

At follow-up, parents in the PFC condition continued to report higher social skills on the SSIS ( $B = 4.58, SE = 2.01; p = .023$ ) after controlling for baseline measures, showing maintenance of this effect. A new finding emerged, that children in PFC tended to demonstrate less aggressive behavior during the observed tasks ( $B = -0.01, SE = 0.00; p = .049$ ), potentially suggesting a sleeper effect. Other findings did not maintain at follow-up. Treatment condition accounted for incremental reductions of 35% and 49% of the Level 2 variance in parent SSIS and aggressive behavior at follow-up, respectively. Cohen's  $d$  associated with the effect of PFC was  $.33$  (95% CI  $[.00, .66]$ ) on the SSIS, and  $-.33$  (95% CI  $[-.72, .06]$ ) on aggressive behavior.

We next considered the extent to which PFC relative to CARE normalized friendship behaviors. There were no typically developing children to which the treated children with ADHD could be compared in this study. Therefore, we conducted these analyses using the only measure of friendship behaviors in our sample with strong normative data: the SSIS. At baseline, parents reported 83% of children in PFC and 83% of children in CARE to receive a score of  $\leq 85$  on the SSIS (corresponding to  $\geq 1SD$  below the mean of social skills in the norming sample). At posttreatment, the rates of children receiving a score of  $\leq 85$  were 56% in PFC and 72% in CARE. At follow-up, these rates were 54% in PFC and 72% in CARE.

### Moderation Analyses

There were no interaction effects between treatment condition and age, medication status, or internalizing comorbidity on the primary outcomes. There was one significant interaction (of eight tested) between treatment condition and gender (0 = *boy*; 1 = *girl*). Whereas girls tended to have more negative friendship quality on questionnaires at follow-up relative to boys ( $B = 0.15, SE = 0.13; p = .225$ ), PFC may be better for girls at mitigating their negative friendship quality ( $B = -0.37, SE = 0.17; p = .025$ ). Because this was the only result for moderation by gender, we did not consider it further.

Consistent interaction effects existed between treatment condition and whether the family had received previous psychosocial treatment for the child's ADHD behaviors (0 = *no previous treatment*; 1 = *previous treatment*). Children with previous psychosocial treatment, compared with those without it, had a pattern of poorer friendship quality at posttreatment and follow-up after controlling for baseline, suggesting they are an at-risk group. In each case, PFC mitigated this trend more than CARE. Specifically,

children with previous psychosocial treatment tended to have less positive friendship quality on questionnaires at posttreatment ( $B = -0.10, SE = 0.07; p = .152$ ) and at follow-up ( $B = -0.21, SE = 0.08; p = .008$ ), but treatment condition moderated both effects ( $B = 0.23, SE = 0.10; p = .023$  and  $B = 0.40, SE = 0.16; p = .012$ , respectively). This same pattern occurred on the observational measures at follow-up, where children with previous psychosocial treatment had less positive ( $B = -0.06, SE = 0.04; p = .105$ ) and more negative friendship quality ( $B = 0.09, SE = 0.03; p = .001$ ), but treatment condition again moderated both effects ( $B = 0.12, SE = 0.06; p = .040$  and  $B = -0.14, SE = 0.04; p = .001$ , respectively). The direction of all results was consistent, in that PFC benefitted the families that had received previous psychosocial treatment for their child's ADHD.

Interaction effects also existed between treatment condition and comorbid externalizing disorders (0 = *no externalizing*, 1 = *externalizing*), where PFC relative to CARE was consistently associated with less negative friendship quality in children with this comorbidity. Children with externalizing comorbidity, relative to those without it, had more negative friendship quality on questionnaires at posttreatment ( $B = 0.19, SE = 0.09; p = .047$ ) and at follow-up ( $B = 0.37, SE = 0.11; p = .001$ ), but PFC mitigated this effect ( $B = -0.24, SE = 0.11; p = .028$  and  $B = -0.54, SE = 0.16; p = .001$ , respectively). Children with externalizing comorbidity also showed more negative friendship quality on observational measures at follow-up ( $B = 0.08, SE = 0.03; p = .003$ ), and PFC again mitigated this effect ( $B = -0.09, SE = 0.03; p = .003$ ).

### Discussion

We tested a novel intervention that teaches skills to parents to address their children's friendship problems (PFC), relative to an active comparison treatment containing psychoeducation and social support around friendship difficulties (CARE), in families of elementary school-age children with ADHD and social impairment. Overall, children improved in positive friendship quality and friendship behaviors, regardless of the intervention they received. No main effects were found for treatment condition on the primary outcomes of friendship quality at either posttreatment or 8-month follow-up, although moderation analyses suggested that PFC may benefit some at-risk subgroups of children. On secondary outcomes indicating friendship behaviors, at posttreatment, parents in PFC reported that children had better social skills and less aggressive and argumentative behavior on playdates. At follow-up, parent report of greater social skills in the PFC condition maintained. Potentially, observed prosocial and aggressive behaviors tended to be better in PFC relative to CARE at posttreatment and at follow-up, respectively.

### Intervention Resistance of Friendship Problems

PFC capitalizes on parents' ability to give the in vivo reminders and reinforcers that children with ADHD need to address performance barriers to enacting skilled friendship behaviors during playdates. Our findings suggest that this goal was at least partially achieved. Data from parent report, and suggestions from observations, revealed that children and their friends in the PFC condition did display more positive (social skills, prosocial) and less negative (antagonistic, aggressive) friendship behaviors, though teach-

ers did not corroborate this. Although the findings on observational measures should be interpreted with caution (given  $p$  values close to .05 and CIs of effect sizes that crossed zero), that the observational data were generally in the same direction as parent-report is encouraging.

In contrast to traditional, clinic-based social skills training, PFC therefore showed some efficacy in changing children's behaviors with friends in real world interactions (Evans et al., 2018). There are some suggestions in the existing literature that interventions involving parents may be able to change friendship behaviors in ADHD (Frankel et al., 1997; Gardner et al., 2019; Hoza et al., 2003; Wilkes-Gillan et al., 2016), but no study has evaluated this premise so rigorously, involving multimethod and multiinformant outcome measures, a randomly assigned control group receiving an active comparison intervention, a sample of our size, and follow-up data. Our findings are consistent with theoretical models of children with ADHD possessing performance deficits (where they know the correct action to perform but require assistance, in this case from parents, to carry it out) and suggest that social skills interventions would benefit from incorporating reminders and reinforcers that occur in vivo (Evans et al., 2018).

However, any changes in children's friendship behaviors as a result of PFC did not necessarily translate in to friendship quality. To our knowledge, no interventions have empirical support for changing friendship quality in ADHD populations. Whereas friendship behaviors represent the actions a child carries out, friendship quality is a shared emotional experience that is affected by the friend's interpretations and perceptions. As such, even if a child improves in friendship behaviors, peers may not modify their impressions (Mikami & Normand, 2015). It has been posited to be easier to change the perceptions of one peer at a time relative to the entire peer group, so friendship may be an easier treatment target than peer acceptance (Hoza et al., 2003). Nonetheless, our results suggest the potential power of reputational bias, even in the friendship context. Although an 8-month follow-up could be sufficient time for better friendship behaviors to be noticed by peers, PFC may not have yielded changes in friendship behaviors that were large enough, or sustained enough, to manifest in friendship quality. Because of the entrenched negative impressions peers tend to have about children with ADHD, it may also take a more substantial change in friendship behaviors (than resulted from PFC) to impact peers' impressions.

Thus, one implication for research and practice is that stronger intervention efforts may be needed to address reputational bias, instead of assuming that the friendship context makes an existing reputation less potent. More emphasis in PFC could be placed on helping parents pick supportive friends who respond to their children's positive behaviors; in the buddy intervention carried out in the Summer Treatment Program, the behavioral characteristics of children's friends were related to treatment outcome (Hoza et al., 2003). Additionally, more sustained efforts to change friendship behaviors in PFC might be useful, as a larger change in friendship behaviors may be easier to notice, and therefore translate to relationship quality. Or, perhaps our results underscore the potential need for interventions that have the primary goal of changing peers' perceptions of children with ADHD (Mikami & Normand, 2015).

Another clinical implication is that it may be necessary to intervene with the child and friend together to improve friendship

quality, instead of trying to facilitate friendship quality through the child with ADHD (or the parent of that child). Within the PFC model, perhaps the parent could coach the child and the friend together. The few interventions delivered to both a child with ADHD and a friend have yet to be evaluated relative to a comparison group (Hoza et al., 2003) or did not assess friendship quality (Wilkes-Gillan et al., 2016). However, a randomized trial (not involving children with ADHD) delivered 12 weeks of intervention to 34 dyads of aggressive children and their friends (Salvas, Vitaro, Brendgen, & Cantin, 2016), and showed an effect on improvement in one feature of friendship quality (though not others).

Alternatively, perhaps both PFC and CARE were efficacious, as children on average across conditions saw improvements in positive friendship quality and in more positive and less negative friendship behaviors. It is unknown what would have happened without intervention, as we lacked a no-treatment control group. Because pilot work already found effects for PFC compared with no treatment (Mikami et al., 2010), we thought it was unethical to assign parents to such a control condition. However, a nontreatment study using similar measures found that positive friendship quality was stable while negative friendship quality worsened for children with ADHD, whereas positive and negative friendship quality improved for typically developing children over 6 months (Normand et al., 2013). Therefore, perhaps both PFC and CARE led to improvements in friendship quality (or prevented deterioration in such outcomes).

If CARE is an efficacious approach for friendship problems, this may have occurred because CARE clinicians facilitated an environment where parents helped each other by suggesting recommendations for friendship problems. Parents may be as good as (or better than) clinicians in the skills they generate from their lived experience or more receptive to ideas from one another. Another possibility is that the social support parents provided each other (which was equal in PFC and CARE) is the active ingredient. This may be why CARE was in some cases superior to a manualized, therapist-driven treatment in a randomized trial for homework problems in children with ADHD (Dawson, Wymbs, Marshall, Mautone, & Power, 2016).

### Moderators of Treatment

PFC consistently appeared to benefit two subgroups of children with ADHD, both of whom were at risk for poorer friendship quality. First, PFC was useful if families had previous experience with psychosocial treatment. This moderation was found on both questionnaire and observational measures of friendship quality and across positive and negative dimensions. In addition, children with externalizing comorbidity benefitted from PFC in terms of less negative friendship quality on both questionnaire and observational measures.

Perhaps PFC is ideal for families who have experience with psychosocial interventions (60% of our sample) because these parents are prepared to implement the strategies taught in PFC. By contrast, for parents with limited intervention experience, reducing stigma about their children's symptoms and feeling more empowered to seek services (provided by CARE) may be needed. Another potential way to explain this moderation is that PFC is indicated for the children whose peer problems failed to remit despite

receiving previous psychosocial treatment. This latter interpretation is consistent with the pattern that children with previous psychosocial treatment had poorer friendship quality overall, suggesting that they are an at-risk subgroup. These children may require the intensive approach offered in PFC. Speculatively, it may be useful to include PFC in a multicomponent treatment plan (instead of a stand-alone intervention), whereas newly diagnosed families first receive psychoeducation and behavioral management in a supportive environment, akin to CARE. Children whose peer problems continue would then receive PFC as a specialized program. Future studies could test this empirically using SMART or stepped care designs (e.g., Chronis-Tuscano, Wang, Strickland, Almirall, & Stein, 2016).

Similarly, children with externalizing comorbidities are a clinically important, at-risk subgroup that has more peer problems, and worse long-term adjustment, than children with ADHD alone (Waschbusch, 2002). They may need the intensive approach to addressing friendship problems that is offered in PFC. Positive results of PFC for children with ODD/CD may have been attributable to components from behavioral parent training targeted at increasing child receptivity to parent coaching (Evans et al., 2018). However, children with externalizing comorbidities, similar to those with previous psychosocial treatment, in our dataset were also suggested to be the more severe or complex cases with poorer prognosis overall.

### Strengths, Limitations, and Future Directions

Strengths of this study include the large sample, representing diverse regions of Canada (the English-speaking Vancouver area and the French-speaking Ottawa/Gatineau area). Families were randomly assigned to two active interventions, which were administered with fidelity. Outcomes were assessed via multiple methods and informants, including observational data. Assessment points included baseline (to use as a statistical control for where participants started in functioning), posttreatment, and 8-month follow-up. Indeed, follow-up data are rare in the existing literature yet important to see whether intervention effects maintain or whether there are sleeper effects that surface only well after the intervention ends.

One limitation is that our primary outcomes of friendship quality were restricted to the relationship between the child and the friend who attended the lab visit. There may be friends with whom the parent fostered playdates during PFC but who did not come for the assessment. We also did not examine the extent to which parents in PFC enacted the friendship coaching skills, nor did we test more distal outcomes of improvement in friendships; we will address these questions in future papers with this dataset. Further, we lacked a measure of friendship quantity. We chose to focus on quality because of literature (as reviewed in the Introduction) that the quality of friendships matter, not simply their presence. However, although in general high-positive and low-negative friendship quality is found to confer benefit, a high-quality friendship may magnify deviant peer influences if the friend engages in deviant behavior (Berndt, 2002).

Another limitation is that the parents in our study may have more resources to address their children's issues. This is indicated by their median income (\$115,326) being higher than the average Canadian family (\$84,950; Statistics Canada, 2017), their high

education levels, and the overall demands of study participation. The analytic plan we used, which examined posttreatment and follow-up outcomes separately instead of in a single model, represents an additional limitation. Furthermore, the sample size of 172 families nested into 28 groups (with the sample for observational measures reduced further) is on the small side for multilevel modeling analyses. Finally, although the results for moderation by previous psychosocial treatment for ADHD were interesting, the measure did not distinguish between types of intervention, as parents did not provide thorough explanations about the treatment they received.

Several future directions may increase the scalability of PFC. First, perhaps nonparental adults in the child's life could adopt the friendship coaching role. This could allow more children to access the intervention if their parents do not have the resources to participate. Second, whether PFC could be delivered in 50-min individual as opposed to 90-min group sessions could be explored. This format might also improve dissemination because it is more practical for clinicians to deliver and is consistent with insurance billing. Parents might benefit from hearing other families' experiences in the group format, but individual sessions might allow them to receive more personalized treatment. Third, PFC was delivered by study clinicians who were under close supervision by the Principal Investigators. This likely enhanced fidelity, but it is also important to test whether an intervention can be effectively implemented in the community.

### Conclusion

PFC showed some efficacy for affecting friendship behaviors in children with ADHD, but friendship quality may be more intervention-resistant. However, moderator analyses suggest that PFC may improve friendship quality in some at-risk subgroups of children with ADHD. It is possible that small, iterative steps are required to address social impairment in this population.

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