

Play to the Whistle: A Pilot Investigation of a Sports-Based Intervention for Traumatized Girls in Residential Treatment

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Abstract Adolescents in residential treatment settings have symptoms that prevent them from participation in normal youth activities, which in turn prevent development of social skills and competencies. A sports-based intervention called “Do the Good” (DtG) was designed for this population using trauma-informed treatment principles. This paper describes the intervention model and presents outcome data. A total of 88 female residential students aged 12 to 21 participated, including 62 students voluntarily enrolled in the sports league and 26 treatment-as-usual (TAU) comparisons. Positive behaviors (e.g., helping peers, perseverance) during games were observed and coded for sports league participants and their coaches. Mental health charts of DtG and TAU participants were reviewed for behavior and symptoms prior to program participation, and again post-program. Girls in the sports league exhibited reductions in restraints and time-outs, as well as internalizing and externalizing symptoms. These data provide evidence that sports-based interventions present a promising adjunctive approach for traumatized youth.

Keywords Posttraumatic stress disorder · Complex trauma · Sports · Adolescents · Residential treatment · Positive youth development

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Children in residential treatment facilities frequently evidence severe behavior problems (Ford and Blaustein 2013; Jaffee and Gallop 2007; Knoverek et al. 2013; Zegers et al. 2008; Zelechowski et al. 2013). Their emotional, interpersonal and behavioral problems often prevent them from engaging in “normal” teenage activity (Lyons et al. 2000). They may be socially inappropriate and may evidence uncontrolled behavior to the point of needing time-outs to regain self-control, or physical restraints to maintain safety (Hodgdon et al. 2013; Zegers et al. 2008). These problems often arise in the context of exposure to trauma in their family environment; conversely, such problems may prevent them from successful integration into caring adoptive families.

Over the past decade, a growing number of promising and evidenced-based practices have been developed to treat traumatized youth (Cohen et al. 2004; Ford and Cloitre 2009). Given that traumatized youth experience complex problems, their care often necessitates behavioral and environmental regulation strategies which result in social isolation with minimal physical or intellectual stimulation. However, well-regulated and safe social contact may also provide an important opportunity for skill acquisition which may provide a base for re-integrating into healthy social environments. Therefore, our goal is to examine whether sports can be successfully modified using trauma-informed intervention principles. We will examine the impact of a trauma-informed sports program on the well-being of trauma-exposed girls in residential treatment programs.

Evidence-Based Practices for Complexly Traumatized Youth

Complex trauma exposure is characterized by two elements: 1) it involves serial or repeated exposure to traumatic experiences or events; and 2) it most often occurs in the context of the caregiving environment (e.g., abuse, neglect or exposure to domestic violence). In parallel, complex trauma symptoms manifest as a delay of achieving developmental competencies

including affect and behavior dysregulation, interpersonal disturbance, disturbance of attention and information processing, and somatic dysregulation (Cook et al. 2005). This spectrum of symptoms extends above and beyond, though frequently includes, Posttraumatic Stress Disorder (PTSD) and Major Depressive Disorder, the commonly-recognized trauma sequelae following acute traumas (e.g., accidents or single-incident assaults). Furthermore, this spectrum of symptoms characterizes a vast proportion of children in residential treatment and juvenile justice settings (Jaycox et al. 2004; Marrow and Buffington 2009; Shane et al. 2006). Because of the extreme and pervasive nature of the symptoms experienced by complexly traumatized children, their treatment needs require exceptional creativity and comprehensive approaches.

During the past several years, a handful of treatment models have been developed or adapted for use with children and adolescents impacted by complex trauma (e.g., Ford et al. 2007; Lieberman et al. 2006). Among these, three, in particular, place heavy emphasis on the role of physiological and behavioral strategies of regulation in treatment process: Attachment, Regulation and Competency (ARC; Hodgdon et al. 2013; Kinniburgh et al. 2005), Dialectical Behavior Therapy (DBT; James et al. 2008; Linehan 1987), and Parent–child Interaction Therapy (PCIT; Eyberg et al. 1995; Timmer et al. 2006). These three treatments are comprised of several core components: building secure attachment relationships with adults and peers, developing competency at developmentally-appropriate tasks, and self-regulating in the service of achieving goals. Moreover, these protocolized approaches can combine to form a comprehensive treatment plan providing overall treatment goals and framework (ARC), adolescent skills acquisition (DBT), and caregiver intervention (PCIT).

The ARC framework is explicitly designed for use with children who have experienced intense complex traumatization (Kinniburgh et al. 2005), and has been used with success among complexly traumatized children in foster care and residential treatment settings (Arvidson et al. 2011; Hodgdon et al. 2013). Its therapeutic procedures include psychoeducation, relationship strengthening, social skills, and parent–education training as well as psychodynamic interpretation, cognitive restructuring, behavioral modification, relaxation, expressive arts and movement. Through building skills, stabilizing internal distress, and strengthening the security of the care giving system, interventions guided by this framework seek to provide children with generalizing tools that enhance resilient outcome.

DST is an empirically supported treatment for the reduction of general psychiatric symptoms and suicidal ideation in adolescents (Rathus and Miller 2002). The DBT curriculum provides clients with concrete tools for regulating affects and meeting goals (Linehan et al. 1992). For example, in DBT, clients are taught to specifically address concerns, to use physical activity to regulate stress, and to be mindful of affects that influence behavior. Each of the four overarching modules

of DBT—mindfulness, emotion regulation, distress tolerance, and interpersonal effectiveness—places heavy emphasis on cultivation of the capacity for self-regulation and learning and practice of a range of regulation skills.

In contrast to the overarching goals of attachment, self-regulation and self-efficacy in the ARC model, and the self-containment goals of DBT, PCIT works to help caregivers find communication strategies to reduce oppositional and out-of-control behavior (Timmer et al. 2006; Urquiza and McNeil 1996). This goal is attained through live-action coaching to caregivers in service of three main goals: 1) providing specific, behaviorally-anchored expectations to children; 2) devoting positive attention to children during play; and 3) providing concrete, specific praise for positive behavior (Eyberg et al. 1995). Used widely with maltreated children, PCIT has demonstrated efficacy across settings (Borrego et al. 2008; Matos et al. 2006; Niec et al. 2005). The efficacy of PCIT with young children shows promise for an upward extension of this treatment with parents and adolescents.

Team Sports for Complexly-Traumatized Youth

Recent research in sports psychology has examined the impact of sports on positive youth development, particularly for at-risk youth. Studies have documented that physical activity in general, and team sports in particular, have the potential to help at-risk youth develop increased self-efficacy, improved peer relationships, better physical health, and more goal-directed activity (e.g., Branta and Goodway 1996; Petitpas et al. 2004; Ratey 2008). The effects of physical activity on mental health are well established (Penedo and Dahn 2005); furthermore, sports have been used as way of teaching life skills. For example, Sharpe et al. (1995) found that a sports curriculum was able to increase participating students' leadership and social skills.

Similarly, Branta and Goodway (1996) examined the impact of sports in a sample of urban at-risk youth whose behaviors featured aggression and poor social problem-solving. Experts in sports and mental health were deployed in schools with no physical education programs. Following consultation with sports experts, teachers provided physical activities in the classroom and found a decrease in children's aggressive behaviors. Furthermore, specific coaching behaviors seem to be a significant factor influencing the degree to which sports lead to positive youth development (e.g., Smith and Smoll 1996, 1997; Newton et al. 2007).

Team sports may be an ideal method for delivering an adjunctive treatment for severely traumatized children. Team sports have several elements. 1) *They may be fun*, and may be more engaging and motivating than standard psychotherapy. 2) *They are cooperative*. Sports require peers to navigate difficult social situations and to establish rapport with their coach, an authority figure and mentor. 3) *They are skill-based*,

which may build competence and self-esteem. 4) *They are highly physically engaging*. Children who are experiencing hyperarousal symptoms consistent with PTSD may be able to mobilize their physiological activity in the service of a fun activity. 5) *They are goal-directed* and require using higher cognitive functions of foresight, planning, impulse inhibition and assessment of consequences. 6) *They are easy to disseminate*. Interventionists can be laypersons with minimal training, making them economical to deliver. 7) *They can be modified* to incorporate techniques with known effectiveness. Sports can incorporate principles of Dialectical Behavior Therapy (DBT) such as emotion regulation, interpersonal effectiveness, distress tolerance, and mindfulness; and, they can also incorporate communication styles taught in PCIT. Therefore, trauma-informed sports may serve as an effective adjunct treatment for adolescents.

Do the Good: A Trauma-Informed Sports Curriculum for Adolescents in Residential Treatment Settings

One example of a trauma-informed sports curriculum, referred to as the “Do the Good” (DtG) program, was developed by a collaboration between Justice Resource Institute and the second author to serve as an adjunct to routine mental health services provided in residential settings for adolescents with histories of severe emotional and behavioral problems. Given this intended role as an ancillary component of residential treatment for these youth, DtG was designed to adhere to guidelines for Evidence-Based Practices in Psychology (EBPP) established by the American Psychological Association (American Psychological Association Presidential Task Force on Evidence-Based Practice 2006) and to attend to the particular importance and challenges of developing and implementing evidence-based practices for children and adolescents in naturalistic settings (Kendall and Beidas 2007). Therapeutic skills selected for transmission through the DtG curriculum were drawn from clinical skill sets for youth and their adult caregivers covered by well-established empirically supported treatments for dysregulated youth, respectively. In the DtG curriculum, ARC provides the overall treatment philosophy; DBT principles provide the specific intervention content to teach to players; and PCIT principles provides the vehicle to help coaches deliver the content.

The DtG curriculum draws upon the ARC framework to guide its players to build competency, self-regulation and strong player–team relationships. For example, the ARC philosophy is used to help educate coaches about their players’ reactivity to stressors on and off the basketball court. The DtG curriculum draws from the PCIT model by providing live-action coaching to coaches and through helping coaches achieve the PCIT caregiver goals. Coaches are taught to provide specific, behaviorally-linked praise immediately when a behavior occurs; to spend time one-on-one with each player as she comes off the court for substitutions in plays; and

to use “circle-ups” as time to provide specific expectations for behaviors and game strategy. Taken together, the curriculum provides player and caregiver (i.e., coach) goals and structure to not only create a successful recreational atmosphere, but to work in conjunction with the therapeutic goals of each of the players.

DtG has reformulated DBT modules for use on the playing field. For example, mindfulness skills in DBT are transformed into “show up” skills on the basketball court where players are encouraged to be aware of their emotional reactions and use them in service of their goals. Emotion regulation in DBT is found in “play to the whistle,” where players have to find ways to persevere despite frustration, and in “fill your tank,” where positive reinforcement and re-defining of goals and successes are used to de-escalate tension. Distress tolerance elements are found in “play to the whistle,” where players are taught to keep up the play despite mistakes until their coach signals them to stop play. Finally, interpersonal effectiveness is taught in the “build your team” and “fill the tank” modules, where players are taught to take responsibility for action, provide leadership and coaching to one another, and support and praise one another.

The Present Study

Given that no research, to date, has examined the impact of trauma-informed sports on youth residing in residential treatment facilities, nor has it examined the impact of sports explicitly with a sample of maltreated adolescents, the goals of the present study are to present outcome data on a pilot examination of sports in this setting. In particular, we propose two goals: 1) to provide preliminary data on the intervention’s effects on its participants; and 2) to examine the capacity to implement successfully the DtG therapeutic curriculum in a sports league housed within youth residential treatment settings by examining player and coach behaviors. Briefly, the effectiveness of trauma-informed sports for girls in residential treatment was evaluated through pre-post chart review of participating and non-participating comparison student mental health and treatment milieu behavioral data, and through live observation games played by a sports league comprised of residential schools.

Method

Overview

Data was collected on the mental and behavioral health of students during the basketball season of the Doc Wayne Athletic League, a DtG-based sports league for girls in residential treatment facilities that employs the trauma-informed sports curriculum. Data was also collected from children who did not

participate in league play but who were engaged in treatment at the same residential schools as those playing in the league (treatment as usual, or TAU). Observational data were collected from six residential treatment facilities serving adolescent females aged 12 to 21, and chart data were acquired from three of the six programs. Chart data were collected from children in the league, as well as non-participating children in the residential programs, to investigate change in sports-engaged students at post-season compared to pre-season baseline data and compared to non-participating peers. Furthermore, in order to provide data on the feasibility of implementation of the trauma-informed sports curriculum, observation of both students and coaches at each basketball game was used to determine whether coaches were implementing the program, and whether program principles were employed with increasing frequency throughout the season. All evaluation activities conducted for this study were reviewed and approved by a certified Institutional Review Board (IRB).

Participants

Evaluation participants consisted of 88 adolescent girls aged 12 to 21 drawn from six residential treatment facilities. Students were of diverse ethnocultural backgrounds with approximately 30 % Caucasian, 39 % African-American, 26 % Hispanic, and 4 % mixed ethnicity or other. All girls had a history of childhood physical abuse, sexual abuse, or neglect as documented by state protective services, and met criteria for posttraumatic stress disorder (PTSD), as determined by clinician diagnosis. From this sample of 88 girls, 62 were voluntarily enrolled in the Doc Wayne Athletic League (“DtG participants”) and 26 served as treatment-as-usual (“TAU participants”) comparison students (see Fig. 1). All league players had observational behavior data from sporting events. Of the 62 in the league, 28 had available data on their behavior and mental health. All 26 TAU participants had behavioral and mental health data available. All participation in this therapeutic sports league is optional with students enrolling each season on an elective basis.

The six participating residential treatment facilities were all designed in accordance with state Department of Education regulations and were each designed to serve adolescents with severe emotional and behavioral problems and placement disruption. The six schools were interspersed across several suburban and metropolitan regions of a mid-sized state in the Northeastern United States. Comparison participants received treatment-as-usual (TAU) in the same residential treatment setting as girls in the intervention. In order to be enrolled in the residential treatment program, girls must meet criteria for a severe emotional disturbance as defined by the Clinician Assessment of Needs and Strengths (Lyons et al. 2003), a platform for documenting case history and clinician diagnoses. The majority of participants have current or prior involvement

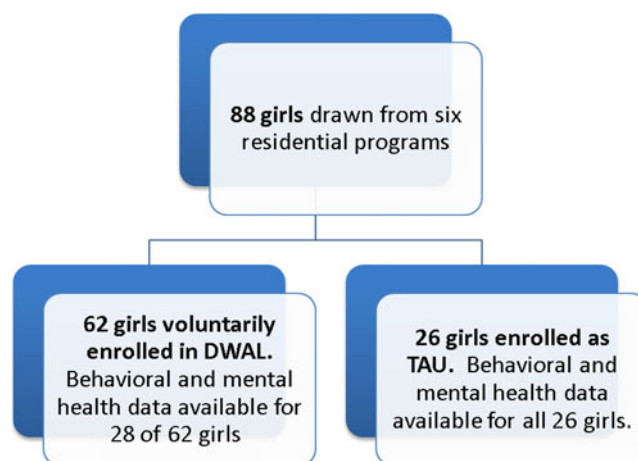


Fig. 1 Participant enrollment and data

with the state’s child protective service, and 90 % have histories of abuse and/or neglect. In the present evaluation, inclusion as a DtG participant or comparison student was based upon enrollment in one of the six participating residential treatment facilities by the third week of the study intervention and continued residential placement through at least the 10th week of the DtG intervention prior to discharge.

Intervention

Do the Good (DtG)

The DtG curriculum, which as defined above has been derived from components of empirically based and empirically supported treatments for youth with behavioral dysregulation and histories of complex trauma exposure. The DtG curriculum trains coaches to facilitate skills through four sports-themed therapeutic goal modules: “play to the whistle” (e.g., perseverance, putting aside frustration while pursuing a goal), “show up” (e.g., commit to one’s best possible performance, awareness of emotional reactions to distress), “build your team” (e.g., leadership skills and responsibility-taking), and “fill the tank” (e.g., provide support for one another, framing one’s games in terms of successes).

The DtG curriculum rotates on a seasonal basis and includes separate seasons for basketball, soccer and softball. Evaluation data for all DtG participants in the present study was drawn from review of routine clinical chart data captured at time points corresponding to the month immediately prior, during, and following the league’s 2009 basketball season. Enrollment in the therapeutic sports league was voluntary. Participants attended a once-weekly hour-long basketball game played against a competing residential treatment facility team over a 5-month season. Three games were held each night (i.e., each school would play one game/night). Once every 6 weeks, the league hosted a “skills clinic” in place of

the game that taught basic basketball skills (shooting, dribbling, etc.) and introduced the new skill module.

Coach Training

Coaches were both male and female, and had either high school diplomas or Bachelor's degrees. None of the coaches had any specialized mental health training beyond that of floor staff in residential programs, which includes training in planning and implementing behavioral treatment plans according to the therapeutic milieu of the residential program. All coaches participated in a 24-h training course, with two full-day follow-up courses during the season. The training was conducted by a coaching expert who designed the curriculum. In addition to teaching coaching-techniques, coaches were provided with psychoeducation about the effects of trauma on youth and how trauma symptoms may manifest during games. Between games, coaches would consult weekly with the coaching expert on the prior game and make coaching goals for improvement (e.g., provide more specific praise) for the next game. Coaches were instructed throughout the game by a coaching expert who encouraged their use of four target behaviors: *circle-ups*, *one-on-one conversations with players*, use of *specific praise* and *building of a team identity*. The coaching expert would instruct coaches by consulting with them on the side lines and between plays. Using a parallel process which mirrored the coaching style he intended to encourage, he would provide specific feedback and note positive coaching behaviors.

Treatment as Usual (TAU)

Treatment as usual in the residential treatment setting involves structured activities, an adapted educational environment, psychiatric and medical consultation, and individual, group and family psychotherapy. Participants' stay is typically 12 to 18 months, with a minimum of 6 months. The programs are multidisciplinary and eclectic, drawing from trauma-informed models including DBT, ARC, and Cognitive-Behavioral Therapy. Participants who elected to enroll in the DtG-based sports league continued with treatment as usual. Participants who elected not to enroll in the league participated in a group activity in their residential setting during games.

Measures

Outcome Data

Milieu Behavioral Data Behavioral data in the treatment milieu were culled from chart review. The data included two variables: 1) need for physical restraints in programs, and 2) need for use of time-outs in programs. Each of these events is the consequence of varying degrees of escalation of unsafe,

aggressive and out-of-control behavior. Physical restraints and time-outs were calculated by tallying the occurrence of each event for the 10 weeks prior to the start of the program ("pre-Dtg"), and the last 5 weeks of the program and 5 weeks following the conclusion of the program ("post-Dtg"). The rationale for this time span was to allow for equal time periods of data collection with the assumption that the majority of gains from the program would be evident by the latter third of the program.

Mental Health When available, mental health was determined using Achenbach's Child Behavior Checklist (CBCL), a standardized instrument filled out by caregivers, therapists or teachers (In this case, it was filled out by the child's therapist every 3 months; CBCL scores were sometimes unavailable if the child's therapist had not filled out the instrument in a timely manner). The CBCL (Achenbach and Edelbrock 1979; Achenbach et al. 1991) is a widely-used 118-item instrument that can be reliably separated into Internalizing (anxiety/depression, withdrawal, somatic complaints) and Externalizing (delinquency, aggression) subscales. Internal consistency has ranged from .89 to .93 in prior research (Achenbach et al. 1991) and .91 for the current study. The CBCL has been found to have strong concurrent validity in clinical populations (Achenbach and Edelbrock 1979). Scores of 64 or higher are commonly considered the cutoff for clinically significant problems on a given subscale. Data was collected pre- and post-Dtg.

Observational Measures In order to examine whether the trauma-informed curriculum was successfully implemented, coaches' and players' DtG skills utilization was tracked on a weekly basis through live coding of observed behaviors in each game, consistent with techniques outlined by Reid (1982). Time and budget limitations allowed for only one observer. In order to create the coding measure, the observer attended all coach trainings and consulted with the coaching expert to agree upon a set of observable behaviors for both coaches and players (See Table 2 for list of behaviors). During games, all players and coaches (4 per game, 2 per team) were observed. Basketball was played in the 6-on-6 player format, but players off the court awaiting their turn to play (ranging from 0 to 14 youth/game) were observed as well.

Coach Skills Utilization Coach skill utilization was collected via observation of coaching behaviors at each game. Tallies were collected for each of the following target behaviors: using circle-ups as a vehicle for teaching, praise and reflection; one-on-one praise and feedback to students; use of specific praise when providing feedback (e.g., "the way you communicated with Vanessa during that play is a great example of how to build the team, and demonstrates your commitment to the group; I'm proud of you" versus a simple "good

job”); and facilitation of a clear team identity (e.g., leading team chants, bringing banners for their team). Data were averaged from the first 3 weeks of play and the last 3 weeks of play to examine the dissemination of training efforts among coaches, and on-the-court improved behavior in players. Trauma-informed coaching skills utilization was summed across the entire game season for use as predictors of treatment outcome.

Player Skills Utilization Student skills utilization was collected via observation of student game behaviors over a 5-month period. Tallies were collected for each of the following target behaviors: conflicts (e.g., losing of one’s temper, crying, arguments with referees or other students), conflict resolution (e.g., apologizing or accepting responsibility for behavior, “holding” one’s temper when slighted), helping behaviors (clapping for injured players, checking in with injured players, offering comfort/encouragement to team-mates), participation in coaching huddles or circle-ups (i.e., during teaching or reflection moments, offering praise to peers, asking questions, providing suggestions to the team), communication with others on the court, and offering encouragement or praise to peers. Student skills utilization was computed in the same manner as for coaches.

Procedure

Each game was attended by a trained coder who observed target coach and player behaviors. Each occurrence of the behavior was descriptively specified (e.g., “encouragement” included verbal statements such as “good job,” “you can do it,” “shake it off,” as well as non-verbal behaviors such as high-fives). Games were open to the public and players were notified of the presence of the observer. Research assistants were employed for chart review, blind to treatment condition. Chart review was collected by transferring mental health and incident data to a data collection form. All behavioral and mental health data were collected prior to the chart review as part of normal quality assurance reporting for the facility. Each restraint, time-out, or behavioral incident was documented at the residential facility and highlighted in each chart by facility staff. Dates of each event were recorded. CBCLs were collected every 3 months at the residential treatment facilities, and the pre-collected CBCLs within the specified time frame were used as outcomes.

Data Analysis

In order to determine whether students participating in the DtG curriculum showed improvements over time, and showed improvements compared to treatment-as-usual peers, repeated measures ANOVAs were used, with assessment time point as the within-subjects variable and intervention group

as a between-subjects factor. Post-hoc tests compared whether children had significant changes in outcomes by group. T-tests of coaching and player DtG skills utilization were used to examine differences from the start of the season to the end of the season. Because of the small sample size, we also report marginally significant effects between probabilities of .05 to .10.

Results

Sample Descriptives

Each school brought 6–17 players each week; on average, each team brought 9 students/week. Eleven coaches participated in DtG, 7 of which were male. All 62 DtG-participating students were included in the present evaluation for purposes of live observation and coding of clinical skills acquisition exhibited in game behaviors.

Research Questions

Are players showing improvements in target outcomes of behavior and mental health, compared to treatment-as-usual peers?

Restraints and Time-Outs

A repeated measures ANOVA with a Greenhouse-Geisser correction determined there was a marginally-significant main effect of frequency of restraints over time ($F(1, 49) = 2.92$, $p < .10$), and there was a significant interaction between frequency of restraints and treatment condition ($F(1, 49) = 11.58$, $p < .001$) (See Fig. 1). Post hoc tests using the Bonferroni correction revealed that DtG participants had no significant change in the frequency with which they were restrained from pre- to post-DtG ($p > .5$), while participants in the TAU group had a significant increase in restraint usage ($p < .001$). DtG vs. TAU participants were not significantly different pre-DtG ($p > .05$), but were significantly different post-DtG ($p < .01$). Thus, while children in the sports league largely stayed the same over time, children who were not in the league showed an increase in restraint usage (See Table 1 and Fig. 2).

There was no significant main effect for time-outs over time ($F(1, 53) = 0.01$, $p > .05$), but there was a significant interaction between number of time-outs and treatment condition ($F(1, 54) = 5.21$, $p < .05$). Post hoc tests using the Bonferroni correction revealed that while DtG participants had a marginally significant decrease in time-out from pre- to post-DtG ($p = .10$), the TAU group had a marginally significant increase in time-outs ($p = .10$). DtG vs. TAU participants were not significantly different at during pre-DtG ($p > .05$), but

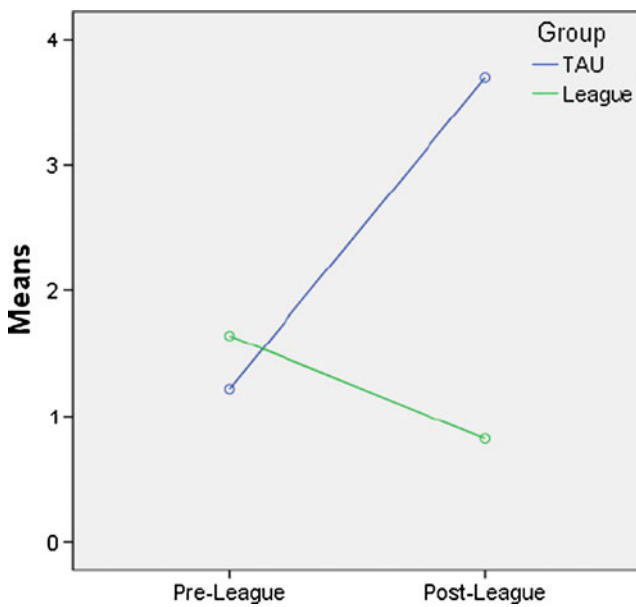


Fig. 2 Restraints by group over time

were marginally significantly different post-DtG ($p < .10$). Thus, while DtG children had fewer time-outs over time, TAU children had more over time (See Table 1 and Fig. 3).

CBCL Symptoms

There was no main effect of time on internalizing symptoms ($F(1, 21) = .37, p > .05$), but there was a significant interaction of treatment group and internalizing score ($F(1, 21) = 11.88, p < .01$). Post hoc tests using the Bonferroni correction revealed that DtG participants had a statistically significant decrease in internalizing symptoms from pre- to post-DtG

($p < .01$), while participants in the TAU group had a statistically significant increase in internalizing symptoms ($p < .01$). DtG vs. TAU participants were not significantly different pre-DtG ($p > .05$), but were marginally significantly different post-DtG ($p = .10$). Thus, while DtG children's internalizing symptoms improved, TAU children's symptoms worsened (See Table 1 and Fig. 4).

There was no significant effect of time on externalizing symptoms ($F(1, 21) = .16, p > .05$), but there was a significant interaction between externalizing symptoms and treatment condition ($F(1, 21) = 11.20, p < .01$). Post hoc tests using the Bonferroni correction revealed that DtG participants had a statistically significant decrease in externalizing symptoms from pre- to post-DtG ($p < .01$), while participants in the TAU group had a marginally significant increase in externalizing symptoms ($p < .10$). DtG vs. TAU participants were significantly different pre-DtG ($p < .05$), with DtG participants having significantly higher symptoms. DtG and TAU participants were not significantly different post-DtG ($p > .05$). Thus, though the two groups were not different post-DtG, while DtG children's externalizing symptoms improved, the TAU group's externalizing symptoms worsened (See Table 1 and Fig. 5).

There was no significant main effect of time on total CBCL score ($F(1, 21) = .08, p > .05$), but there was a significant interaction between total CBCL score and treatment condition ($F(1, 21) = 18.08, p < .001$). Post hoc tests using the Bonferroni correction revealed that DtG participants had a statistically significant decrease in total CBCL symptoms from pre- to post-DtG ($p < .01$), while participants in the TAU group had a marginally significant increase in total CBCL symptoms ($p < .10$). DtG vs. TAU participants were

Table 1 Means and standard deviations of outcome data

	Total M(SD)	TAU M(SD)	DtG M(SD)	Comparison
Restraints				
Pre	1.43(.43)	1.22(.64)	1.64(.58)	TAU-Pre < TAU-Post***; DtG-Post < TAU-Post**
Post	2.26(.44)	3.69(.65)	.82(.59)	
Time-outs				
Pre	.91(.25)	.54(.36)	1.27(.33)	DtG-Pre > DtG-Post ⁺ ; TAU-Pre < TAU-Post ⁺ ; DtG-Post < TAU-Post ⁺
Post	.91(.24)	1.35(.35)	.47(.33)	
Internalizing				
Pre	61.49(1.94)	59.30(2.86)	63.69(2.51)	DtG-Pre > DtG-Post**; TAU-Pre < TAU-Post**; DtG-Post < TAU-Post ⁺
Post	62.33(1.51)	64.80(2.27)	59.85(1.99)	
Externalizing				
Pre	61.55(2.20)	56.10(3.31)	67.00(2.90)	DtG-Pre > DtG-Post**; TAU-Pre < TAU-Post ⁺ ; DtG-Pre > TAU-Pre*
Post	60.93(2.24)	60.70(3.37)	61.15(2.95)	
Total symptoms				
Pre	61.66(1.69)	58.10(2.55)	65.23(2.24)	DtG-Pre > DtG-Post**; TAU-Pre < TAU-Post ⁺ ; DtG-Pre > TAU-Pre*
Post	61.98(1.54)	63.20(2.31)	60.77(2.03)	

⁺ = $p < .10$, * = $p < .05$, ** = $p < .01$, *** = $p < .001$

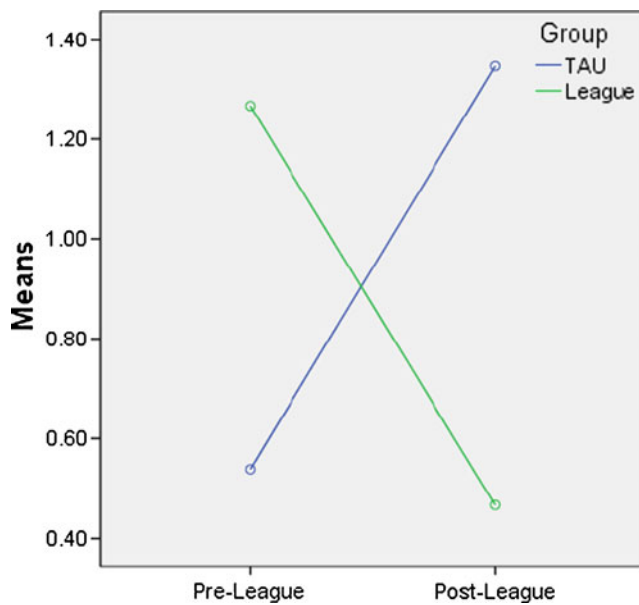


Fig. 3 Time-outs by group over time

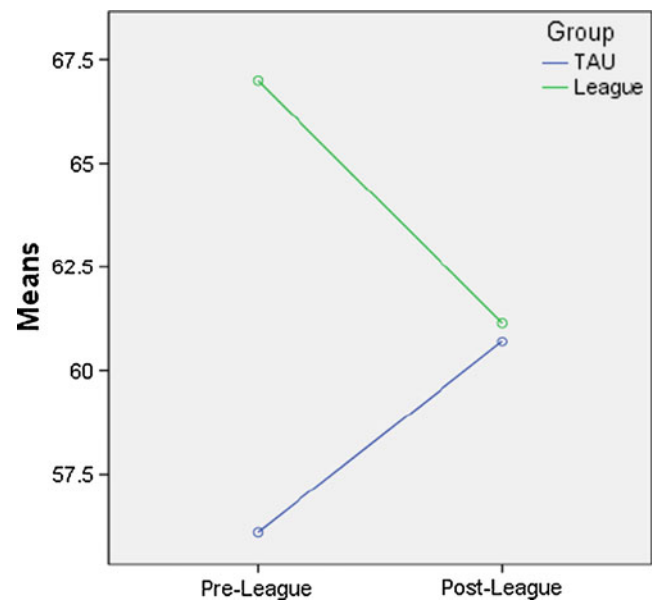


Fig. 5 Externalizing symptoms, as measured by the CBCL, over time

significantly different pre-DtG ($p < .05$), with DtG participants having significantly higher symptoms. DtG and TAU participants were not significantly different post-DtG ($p > .05$). Thus, though the two groups were not different post-DtG, while DtG children's total CBCL symptoms improved, TAU children's total CBCL symptoms worsened (See Table 1 and Fig. 6).

Do coaches' DtG game behaviors increase with training? Coaches showed a marginal increase in use of one-

on-one time with players ($t(5) = 2.15$, $p < .10$) and in attempts to create a clear team identity ($t(5) = 2.27$, $p < .10$). While these effects are not statistically significant, they represent moderate effect sizes, in accordance with Cohen's (1992) guidelines (See Table 2).

Do players' game behaviors increase with participation in DtG? Players showed a significant increase in their peer-to-peer helping behaviors ($t(5) = 3.93$, $p = .01$), and a marginal increase in encouragement of peers ($t(5) = 2.00$, $p = .10$). Again, this latter effect represents a moderate effect size (See Table 2).

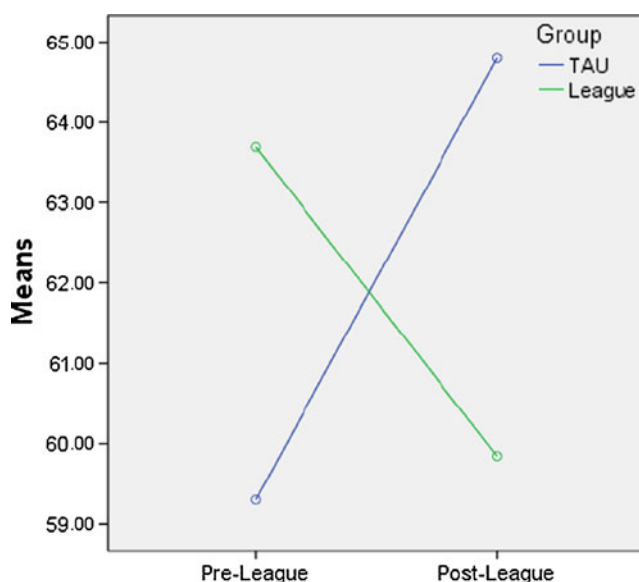


Fig. 4 Internalized symptoms, as measured by the CBCL, over time

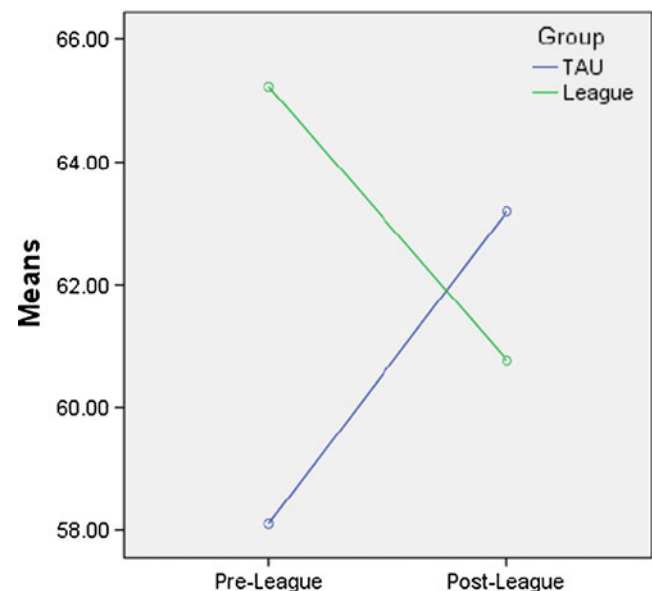


Fig. 6 Total symptoms, as measured by the CBCL, over time

Table 2 Coaches' and players game behaviors

	Number of occurrences per game	
	First month of season M(SD)	Last month of season M(SD)
Coaches' game behaviors		
Held circle-ups	2.5(1.05)	3.5(2.43)
One-on-one with players	5.5(3.08)	11.5(4.51) ⁺
Provided specific praise	5.16(2.93)	4.83(3.13)
Built team identity	3.00(2.28)	6.50(2.66) ⁺
Players' game behaviors		
Engaged in conflict	2.67(3.01)	1.67(1.63)
Resolved conflict	4.00(2.00)	6.83(5.19)
Helped other player	1.16(1.17)	7.17(4.49)*
Communicated with teammates	3.67(2.87)	5.83(5.31)
Encouraged teammate	17.67(11.02)	24.33(11.61) ⁺
Participated in circle-up	11.00(11.61)	6.17(5.08)

⁺ = $p < .1$; * = $p < .05$

Discussion

Overall, trauma-informed sports as an adjunct to TAU appear to have had a significant positive impact on behavior and mental health in a diverse sample of adolescent girls across six residential treatment settings. To our knowledge, no other program has implemented a therapeutic sports program within the milieu of residential treatment. However, other programs have been used with similar success with urban at-risk youth (Bell 1997; Papacharisis et al. 2005). These data are comparable to outcomes observed in community-based samples in which violent, anti-social and out-of-control behavior have shown significant reductions with programs incorporating physical elements (Bell and Suggs 1998; Branta and Goodway 1996). These data are unique in showing significant effectiveness with a residential treatment sample as other research has indicated that few short-term interventions result in behavioral or mental health improvements with this group (Connor et al. 2002). Because there is currently no diagnosis for children with histories of complex trauma, there are few treatments designed specifically for this group (D'Andrea et al. 2012).

This evaluation highlights the potential of therapeutic trauma-informed adjunctive treatments that incorporate elements of therapeutic practices whose effectiveness has been established. Trauma-informed sports have the potential to impact positively a large number of traumatized children in a relatively easy-to-deliver manner as all coaches can be laypersons and not therapists. Given that this population has chronic and severe mental health disturbances, finding a significant impact in a program administered largely by youth workers is compelling and merits further exploration.

The youth served in this program might frequently be considered ineligible for extracurricular activities as a result

of their behavioral dysregulation. Furthermore, the severity of their behavioral disturbances prevents them from integrating into less restrictive family and school settings. Therefore, the fact that DtG participants showed improvements in behavior and mental health is clinically meaningful. In particular, it is intriguing that youth who appeared to be functioning worse along certain dimensions at the outset (e.g., time-outs) were able to demonstrate significant improvement across other outcome domains, and to improve relative to peers with less severe behavioral problems. It is notable that in several cases, post-DtG data for children in the intervention and their TAU peers were different at baseline and were not different at the end of the intervention, because the DtG group started out worse and improved, while the TAU group started out better and declined. The improvement of mental health and behavior of youth in a sports condition is encouraging; however, why the intervention group improves while the TAU group declines warrants additional inquiry.

It is unclear from these data why the DtG curriculum might have had such a significant impact on youth. One possibility may be the simple opportunity for physical exercise, which may be regulating for children whose mental health symptoms may result in physiological hyperarousal (such as posttraumatic stress disorder; e.g., Cook et al. 2005). Not surprisingly, there are few opportunities for unrestricted movement for children in residential treatment, and the absence of such opportunities may actually impede recovery. Perhaps the more embodied, physiologically regulating nature of trauma-informed sports, in the context of a supportive community of peers, may be functioning as a more rapid catalyst of behavioral change than traditional psychotherapeutic approaches with this population. Engaging in a shared shift in collaborative behavioral practices through guided and contained opportunities for repetition and mastery may further solidify these gains (van der Kolk 2006). Another possibility is that the coaches involved in the study were employing communication styles which were therapeutic for the youth involved, therefore providing them with the incentive and capacity for self-regulation (e.g., Urquiza and McNeil 1996). Finally, the opportunity for normative socializing, and for serving as a leader among one's peers, may have been invaluable for this group of girls whose daily activities are normally restricted (Bell and Suggs 1998). Other studies have documented that social resources are significant contributors to improvement among children in residential treatment (Lipschitz-Elhaw and Itzhaky 2005). Most likely, it is some combination of these factors that led to the gains seen by DtG participants.

Limitations and Future Directions

These data are limited for several reasons. First, unequal group size and quasi-experimental design of this pilot study limits the generalizability with which statistical conclusions drawn from the present analyses can be considered and also

poses a potential threat to internal validity. This problem may have been enhanced by missing data, particularly for mental health measures. Because the study methodology relied upon blind chart review to protect confidentiality, missing data could not be searched out for the purposes of this study. However, data trends appear to provide strong indications in support of this program, and it is of note that the sample size in this study is larger than most samples employed in a randomized clinical trial.

One major limitation was the absence of boys in this initial pilot evaluation of the DtG curriculum. As evaluation participants essentially consisted of a “convenience” sample derived from a preexisting girls’ league based upon the DtG curriculum, it is presently unknown whether and the extent to which this trauma-informed sports-based intervention is effective with adolescent males on these or other outcome indices. This question should undoubtedly be a primary focus of future research, particularly given the general receptiveness of boys to sports-based activities.

Another limitation is with respect to the observations of game behaviors. Because only one evaluator was present for each game, significant events were surely missed. The complexity of interactions occurring with 25 students and staff in a room at a given time ensures that the data presented herein are only a sample of all events that transpired. Also, observational data were aggregated by team, not by individual participant, which limited the possibility of examining how game behavior related to behavior in the residence. Therefore, the game observation data must be considered preliminary.

Finally, it is of note that the children self-selected into participation. Therefore, findings may not generalize to individuals who are disinclined to participate in sports, and may be larger than the effects that might be found if participants were randomized to participation or non-participation, which a future study could undertake. The data presented here may indicate that 1) children get maximum benefit when they elect participation; and/or 2) despite accentuated behavioral and mental health concerns, children who participated in DtG have strengths not reflected in the data collected on behavior in residence or CBCL clinician-reports.

In order to establish the effectiveness of this program, replication is necessary. In future replications, it will be worthwhile to examine the program’s effectiveness with larger samples in other settings and with other populations, such as with boys. Furthermore, expanded data collection which moves beyond chart review data may provide evidence of the program’s impact along multiple dimensions. For example, examining changes in physical health, grades and in peer relationships may be significant for at-risk youth. Future investigations should also measure and control for participants’ interest in athletics, to determine whether athletic interest influences the outcome of the program. Finally, examining long-term improvement, and whether factors such as continued program

involvement impact outcome, will provide further insight into overall program effectiveness.

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