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The effectiveness of outdoor behavioral healthcare with struggling adolescents: A comparison group study a contribution for the special issue: Social innovation in child and youth services

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ABSTRACT

This study examined the longitudinal impact of Outdoor Behavioral Healthcare on youth participants as reported by their parents. This analysis fills a critical gap in past research by including a Treatment as Usual (TAU) comparison group. Findings showed that youth participants who attended an Outdoor Behavioral Healthcare treatment program were, as reported by their parents, were functioning significantly better than the TAU group one year following the program as measured by the Youth Outcome Questionnaire 2.01. Youth who remained in their communities were still at acute levels of psychosocial dysfunction during the same time span. Despite some differences between the means of the treatment and TAU groups across time between gender and groups, a regression analysis revealed age and gender not to be significant predictors of improvement. The only significant predictor was participation in the treatment group.

1. Introduction

Adolescent mental health has become a significant societal concern, with 10–20% of adolescents meeting criteria for a diagnosable mental disorder (Kessler, Berglund, Demler, Jin, & Walters, 2005; Kieling et al., 2011; Merikangas et al., 2010). These disorders are especially disconcerting as they interfere with the accomplishment of normal development tasks (O'Connell, Boat, & Warner, 2009) and can lead to poor school performance, dropout, strained family and social relationships, involvement with the child welfare system, and other disruptive behaviors (Kapphahn, Morreale, Rickert, & Walker, 2006). In the juvenile justice system in the United States (US), it is estimated that 67% to 70% of youth have mental health disorders (Suowyra & Cocozza, 2006). Furthermore, with suicide being the third leading cause of death among adolescents in the US with between 500,000 and one million adolescents attempting suicide each year, 90% of these adolescents possess an underlying mental health disorder (National Center for Injury Prevention and Control, 2016; US Public Health Service, 1999). When left untreated or undertreated, adolescent mental health disorders often lead to adult mental health and chronic health concerns later in life (Belfer, 2008), including premature mortality (Brown et al., 2009). In fact, the US Substance Abuse and Mental Health Services Administration (SAMHSA, 2014) estimates that 2.9 million youth receive professional services for emotional and behavioral problems per year.

1.1. Outdoor behavioral healthcare

Outdoor Behavioral Healthcare (OBH), sometimes referred to as wilderness therapy, is growing as an innovative and growing therapeutic intervention for adolescents struggling with emotional, behavioral, relational, and substance use disorders (Norton et al., 2014). Although various definitions of OBH and wilderness therapy have been proposed, the *Manual of Accreditation Standards for Outdoor Behavioral Healthcare Programs* describes OBH as the "the prescriptive use of wilderness experiences by licensed mental health professionals to meet the therapeutic needs of clients" (Gass et al., 2014, p. 1). Furthermore,

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key components of the OBH approach include:

(a) Extended backcountry travel and wilderness living experiences long enough to allow for clinical assessment, establishment of treatment goals, and a reasonable course of treatment not to exceed the productive impact of the experience.

(b) Active and direct use of clients' participation and responsibility in their therapeutic process.

(c) Continuous group living and regular formal group therapy sessions to foster teamwork and social interactions (excluding solo experiences).

(d) Individual therapy sessions, which may be supported by the inclusion of family therapy.

(e) Adventure experiences utilized to appropriately enhance treatment by fostering the development of eustress (i.e., the positive use of stress) as a beneficial element in the therapeutic experience.

(f) The use of nature in reality as well as a metaphor within the therapeutic process.

(g) A strong ethic of care and support throughout the therapeutic experience (Gass et al., 2014, p. 1).

OBH participants live in the wilderness in group settings, often learning primitive skills such as building fires without matches, backcountry navigation, and engaging in adventure experiences such as rock climbing, rappelling, backpacking, and mountain biking (Magle-Haberek, Tucker, & Gass, 2012).

OBH integrates psychological assessment and traditional psychotherapy models such as Adlerian theory (DeMille & Burdick, 2015), cognitive and behavioral therapies (Berman & Davis-Berman, 2008), psychodynamic therapy (Norton, 2010b), and Narrative Family Therapy (DeMille & Montgomery, 2016) in an outdoor treatment environment. Walsh and Golins (1976) were some of the first to describe the role of the outdoor environment in fostering change, asserting that the outdoors provides individuals with a contrasting environment to observe aspects of themselves often overlooked in a familiar environment. In other words, the outdoors provides a contrast for an individual to gain a new perspective on old patterns that occurred in their familiar environment.

1.2. Limitations of research on OBH

1.2.1. Lack of comparison groups

Over the last 15 years OBH has received greater scholarly attention, especially in North America. General effectiveness studies have reported on youth who participate in treatment in an OBH program improve in overall mental health functioning from admission to discharge (Clark, Marmol, Cooley, & Gathercoal, 2004; DeMille, 2015; Magle-Haberek et al., 2012; Norton, 2008; Tucker, Norton, DeMille, & Hobson, 2016), with treatment gains maintained at six-months post-treatment (Bettmann, Russell, & Parry, 2012; Tucker, Norton, et al., 2016; Zelov, Tucker, & Javorksi, 2013), one-year (Behrens, Santa, & Gass, 2010; Combs, Hoag, Roberts, & Javorski, 2016; Lewis, 2012), and 18-months post treatment (Combs et al., 2016). In addition, participants in OBH programs have reported positive physiological outcomes (DeMille, Comart, & Tucker, 2014; Tucker, Norton, et al., 2016), decreased substance use (Lewis, 2012), decreased depressive symptoms (Norton, 2010a), improvements in mood (Russell, 2005), and decreased conduct disorder behaviors (Lewis, 2012). Studies have also been conducted on OBH in the juvenile justice system (Walsh & Russell, 2010), and adolescent offenders (Gillis & Gass, 2010; Gillis, Gass, & Russell, 2008).

Despite the depth of this research, only a few studies have managed to include comparisons groups, such as comparing matched experimental adventure groups and treatment-as-usual groups (TAU) (Gillis & Gass, 2010) as well as outdoor adventure groups to traditional psychosocial recovery groups (Schell, Cotton, & Luxmoore, 2012); however there is no such research on wilderness therapy (Becker, 2010; Bettmann et al., 2012; Clark et al., 2004; Combs et al., 2016; Norton et al., 2014). With the lack of comparison groups, the generalization of results and ability to establish efficacy is inhibited (Reamer & Siegel, 2008) which has fed criticism of OBH from different fields of mental health (Becker, 2010).

1.2.2. Gender, race and age

In addition, it is still unclear how gender, race, and age play a role in the impact of OBH on clients. Past research has shown that female participants typically enter OBH programs with higher levels of reported dysfunction than their male counterparts (Combs et al., 2016; Russell, 2003; Tucker, Norton, et al., 2016; Tucker, Paul, Hobson, Karoff, & Gass, 2016; Tucker, Smith, & Gass, 2014). However, at discharge some research has reported significantly lower levels of dysfunction for females than males (Russell, 2003; Tucker et al., 2014; Tucker, Paul, et al., 2016); as well as no differences at discharge or six months post discharge across gender (Combs et al., 2016). Similarly, research has not taken a specific look at race and ethnicity beyond reporting out the percent of Non-Caucasian participants (Lewis, 2012; Tucker, Paul, et al., 2016) and some research does not include this information at all due to a small percent of Non-Caucasian clients (Combs et al., 2016). In terms of age, since most clients who attend OBH are adolescents, little research has considered that there may be differences across younger and older adolescents. Combs et al. (2016) did explore if age was predictive of changes at discharge and at six months post discharge for OBH participants and found no impact in terms of age on outcomes. Tucker, Paul, et al. (2016) found that age was negatively correlated with length of OBH treatment; however, age was not significantly related to outcomes. Similarly, Combs et al. (2016) reported no difference in age between youth who were transported to OBH versus those who were not; however, they did not include age as a predictor of change over time but found no effect. Considering the developmental differences of youth who are 12 compared to those who are 17, research is needed to see if youth may show different changes based on their age at intake.

This study was designed to fill these research gaps as well as address the criticisms of a lack of comparison groups by comparing treatment in an OBH program to a treatment as usual (TAU) group. We sought to answer the following specific research questions:

1. What were the pre-and post-differences reported by parents in youth functioning over time for youth involved in wilderness therapy treatment versus youth who received mental health care in their community (TAU)?
2. Were there differences by gender, race, and age across time?
3. What factors predicted youth functioning one year after an intake or parent's original inquiry about wilderness treatment?

2. Methods

2.1. Participants

The original sample included 147 participants in the treatment group and 60 participants in the comparison (TAU) group; however, for better validity, the treatment group was matched to the TAU group for analysis (i.e., 60 subjects placed in each group). To achieve the most appropriate matched design, the age of participants in the treatment sample was truncated to the nearest year to match the truncated format of the control group. Participants that did not fall between 12 and 17 years of age at intake were removed. Participants were then sorted by ethnicity, with Non-Caucasian participants in the treatment sample selected to match the proportion of non-Caucasian youth in the control group as close as possible. The remaining participants were sorted by age and intake/primary YOQ 2.01 scores as reported by parents on the youth's functioning. Selection was stratified by age to match the proportions of the control group as closely as possible. Within each strata, potential participants in the treatment condition were removed in ascending order of initial YOQ 2.01 scores (from lowest to highest) until

Table 1
Ethnicity, gender, and age by treatment group.

	OBH (n = 60)		TAU (n = 60)	
	n	%	n	%
Race				
African American	2	3.3	4	6.9
Asian	3	5.0	3	5.0
Caucasian	51	85.0	46	76.7
Hispanic	1	1.7	1	1.7
Native American	1	1.7	1	1.7
Other	2	3.3	5	8.3
Gender				
Male	40	66.7	38	63.3
Female	20	33.3	22	36.7
Age	M = 15.17 Range (12–17)	SD = 1.14	M = 14.98 Range (12–17)	SD = 1.35

each age strata was populated. This was done since the mean initial YOQ 2.01 scores of the control group were greater than the 147 potential participants in the treatment condition.

The comparison (TAU) group included participants who inquired into treatment at a specific OBH program yet decided to seek treatment within their community. Those in the treatment group were enrolled for treatment at this OBH program and completed treatment. In both the treatment and comparison groups, most of the clients were male, Caucasian and around 15 years of age (See Table 1). Chi-square analyses revealed no significant differences between the groups in terms of gender, $x^2 = 0.147$, $df = 1$, $N = 120$, $p = 0.702$, and race ($x^2 = 1.345$, $df = 1$, $n = 120$, $p = 0.246$). An independent samples t-test revealed there were no significant differences in age between the groups, $t(118) = -0.806$, $p = 0.442$. The average length of treatment at the OBH program was 80.5 days.

2.2. OBH treatment program

Data for this study were gathered from a privately funded OBH program licensed by the Utah Department of Licensing and accredited by the Association for Experiential Education (AEE). All participants in this program were referred for emotional, behavioral, or substance related disorders. Participants had also been unsuccessful with less restrictive treatment modalities (e.g., community-based services) or presented levels of distress that made them a threat to themselves (Tucker, Bettmann, Norton, & Comart, 2015). This program used a continuous flow wilderness trek model, where the treatment team (e.g., therapist, medical staff, and direct care staff) and clients rotated in and out of ongoing groups on wilderness expedition. The group did not operate from a set base camp but moved in a nomadic style within a designated field of operation. This program used an integrated care model and clients received mental health, substance abuse, and general health care services while they were immersed in a wilderness-living setting to ensure integration of care. Participants engaged in academics and earned school credit while in the OBH program.

The mental health and substance abuse services were provided by state licensed mental health providers (e.g. psychologist, clinical social worker, clinical mental health counselor) with a master's degree or higher level of education. The mental health providers spent two days per week in the field where participants received 60 min of individual psychotherapy and 90 min of group psychotherapy. In addition, participants engaged in a treatment milieu, which involved wilderness living, psycho-education groups, adventure therapy experiences, a value-based academic curriculum, and a healthy lifestyle (e.g., healthy diet, sleep habits, work, and exercise). To address dysfunction in family dynamics and prepare participants to reintegrate home after treatment, 60 min of family therapy was also provided weekly using a Narrative Family Therapy approach that has been adapted to the treatment setting (DeMille & Montgomery, 2016). The narrative approach provided the family the structure to “tell and retell” a problem-saturated story and change the family's relationship to their story to one that was more strengths-based. This was done through questions and structured letters to deconstruct problem-saturated narratives and identify unique outcomes leading to alternative or preferred family narratives (DeMille & Burdick, 2015). General health care services and medication management were provided by a licensed medical doctor and managed by a registered nurse. An initial medical evaluation was conducted within three days of arriving at the program for treatment. The assessment included a physical and psychiatric evaluation. Additionally, medication management was provided during the treatment process.

The treatment team met weekly face-to-face to coordinate treatment services. This included medical staff, mental health providers, administrators, and direct care staff supervisors. Within the context of each treatment team member's role participants' mental health, substance, and general health care needs were discussed and necessary services were coordinated. Both the medical staff and mental health providers worked collaboratively to develop a client's treatment and discharge plan.

2.3. Comparison group – treatment as usual (TAU)

Participants in the comparison group or “treatment as usual (TAU)” group consisted of adolescent clients 12–17 years of age whose parents inquired into treatment at the OBH program but decided to seek mental health treatment within their local communities. Due to the severity of distress, random assignment of participants to a “no treatment” control group would be unreasonable and instead for this study a TAU group was used. Participants in the TAU group were recruited to participate in the study via phone call and email after the initial inquiry into treatment. The TAU group included participants who received outpatient individual and family therapy. Additionally, participants who received short-term psychiatric hospitalization and medication management with a physician or psychiatrist were also included in the TAU group.

Of the 60 participants in the comparison group, 62% (n = 37) received outpatient counseling, 20% (n = 12) received psychiatric care, and 51% (n = 31) received medication management services. The range of outpatient services was 1 to 5 h of weekly outpatient services with mean score of 1.63 (SD = 1.19) hours of outpatient counseling. The number of psychiatric visits ranged from 1 to 5 with mean score of 2.56 (SD = 1.42) psychiatric visits.

2.4. Measures: youth-outcome questionnaire 2.01 (Y-OQ 2.01)

Mental health was assessed using the Y-OQ 2.01. The Y-OQ 2.01 is a parent report global measure of adolescent functioning. It is designed measure treatment progress for children and adolescents receiving psychological treatment from a parent or guardian's perspective. The instrument measures overall client functioning that includes six subscales. The subscales include: (a) Intrapersonal Distress, (b) Somatic Symptoms, (c) Interpersonal Relationships, (d) Social Problems, (e) Behavioral Dysfunction, and (f) Critical Items. It is a 64-item parent/guardian report assessment designed to assess youth aged 4 to 17 years (Burlingame et al., 2001). Only the total score which combined all of the subscales into one overall measure of psychological functioning was used in this study.

The instrument reports a high internal consistency ($\alpha = 0.94$) and its test-retest reliability produced an average coefficient of 0.83 (Burlingame, Wells, Lambert, & Cox, 2004). Criterion-related validity for the Y-OQ 2.01 has been established using the Child Behavior Checklist (CBCL; Achenbach, 1991) and the Conners' Parent Rating Scale (Conners, 1990). Correlations with these measures of similar constructs ranged from 0.48 to 0.78 and fell within an acceptable range. In addition, the total CBCL and Y-OQ 2.01 scales were positively correlated ($r = 0.78$). The Y-OQ 2.01 has also been normed to include a

clinical cut-off score of 47, which differentiates functioning above or below a normative level of functioning expected in a non-clinical sample of youth. The lower a total Y-OQ 2.01 score, the better the functioning (Burlingame et al., 2004). Also, the Y-OQ 2.01 has a reliable change index (RCI) of 13 points referring to the amount of change needed to relate to clinically relevant and noticeable changes in youth (Burlingame et al., 2004).

At the time of intake or inquiry, an independent samples *t*-test revealed that there were no significant differences between the Y-OQ 2.01 means of the OBH matched group ($M = 107.2$, $SD = 25.5$) and the comparison group ($M = 106.9$, $SD = 31.6$), $t(118) = -0.070$, $p = 0.944$. This suggests that according to their parents/guardians both groups of youth were functioning at similar levels of dysfunction at intake/inquiry, well above the clinical cut-off of 47 for normal behaviors.

2.5. Procedures

The study used a non-equivalent group, quasi-experimental, pretest, post-test research design to answer the research questions (Rubin & Babbie, 2016). For the treatment group, the Y-OQ 2.01 was administered to parents and/or guardians at admission to the OBH treatment program (Time 1). A follow-up Y-OQ 2.01 was administered approximately one-year after the client completed treatment (Time 2). On average this was 15.0 months after the initial Y-OQ 2.01. For the comparison (TAU) group, parents of participants completed a Y-OQ 2.01 when they inquired into treatment at this OBH program (Time 1). Parents and/or guardians were later contacted both via email and personally by phone and invited to complete a second Y-OQ 2.01 (Time 2). In most instances, this data were gathered from both groups using an online data collection platform, Outcome Tools, in which an email provided a direct link to the measures. On average parents in the comparison group were contacted 17.2 months after they completed their initial Y-OQ 2.01. Of those who agreed to participate in the comparison group, 105 parents/guardians (48.8%) completed an admission and post-treatment Y-OQ 2.01. Since our aim was to look at youth who stayed in the community and received treatment at home, participants were excluded from the study if their youth received treatment in an alternative OBH or residential treatment program. Additionally, incomplete data sets were excluded from this study. Participants were also excluded from the study if they fell outside the age range treated at this OBH program (12–17 years of age) since we were specifically interested in adolescents. Of the 105 completed data sets, 60 met this criteria for inclusion in this study or 27.9% of those who agreed to participate. For this study data were stored on a HIPPA compliant database, and identifying information was removed to ensure participant confidentiality. This study was approved by the Institutional Review Board (IRB) at the second author's institution and informed consent was received from all participants before the collection of data started.

2.6. Data analysis

To answer the first research question, a 2 × 2 repeated measures ANOVA was conducted looking at the main effects of Time (Time 1/Time 2) and Group (OBH/TAU). To answer the second research question, multiple 2 × 2 × 2 repeated measures ANOVAs were conducted to see the relationship between Time × Group × Gender, Time × Group × Race and Time × Group × Age; however there were no significant interactions found for any of these three interactions. Hence, the OBH group and TAU group were examined separately by running additional Time × Gender, Time × Race and Time × Age repeated measures ANOVAs to see if there were differences within each of the groups. Finally, to answer the third research question, a linear ordinary least squares regression analysis was conducted.

Table 2
Comparison of YOQ 2.01 parent/guardian report mean scores at intake/inquiry (Time 1) and one year later (Time 2) across treatment (OBH) and treatment as usual (TAU) group.

Y-OQ 2.01 parent report	Treatment group ($N = 60$)		TAU group ($N = 60$)	
	$M_{Time\ 1}$ (SD)	$M_{Time\ 2}$ (SD)	$M_{Time\ 1}$ (SD)	$M_{Time\ 2}$ (SD)
Total	107.23 (25.5)	51.53 (37.6)[a]	106.87 (31.6)	86.92 (45.1)[a]
Gender				
Males ($n = 40$) ($n = 38$)	103.63 (21.9)	**47.35** (33.8)[a]	108.82 (31.4)	88.76 (46.1)[a]
Females ($n = 20$) ($n = 22$)	114.45 (30.8)	59.90 (44.1)[a]	103.50 (32.5)	83.73 (44.3)[a]
Ethnicity				
Caucasian ($n = 51$) ($n = 46$)	107.31 (25.5)	53.55 (38.1)[a]	106.30 (29.5)	85.65 (44.1)[a]
Non-Caucasian ($n = 9$) ($n = 14$)	106.78 (26.8)	**40.11** (34.7)[a]	108.71 (39.0)	91.07 (49.9)[a]
Age				
Under 16 ($n = 37$) ($n = 37$)	109.51 (28.4)	55.08 (38.6)[a]	101.78 (32.7)	79.38 (45.1)[a]
16 or older ($n = 23$) ($n = 23$)	103.57 (20.0)	**45.83** (35.9)[a]	115.04 (28.5)	99.04 (43.51)[a]

Bold scores reflect scores below or at the clinical cut-off of 47.
[a] Scores reflect clinically significant improvements > 13 points (RCI).

3. Results

3.1. Intake/inquiry to one-year post

Table 2 shows the means for participants in the study at Time 1 and Time 2. The ANOVA revealed significant main effects for Time [$F(1) = 114.67$, $p < 0.001$, *partial eta*$^2 = 0.493$] and Group [$F(1) = 10.22$, $p = 0.002$, partial eta$^2 = 0.080$] as well as a significant interaction between Time x Group [$F(1, 118) = 25.61$, $p < 0.001$, *partial eta*$^2 = 0.178$]. It is important to note that youth in the OBH group had mean improvements on the Y-OQ 2.01 as reported by parents that were 2.75 times larger than those for the comparison group.

3.2. Gender, race and age comparisons

3.2.1. Gender

For both the OBH and TAU groups there were no main effects for Gender or interaction effects for Gender × Time. For the OBH group, it appears that males not females were functioning at the clinical cut off of 47 at one-year post discharge as reported by parents. In addition, it appears males on average had larger mean levels of change than females in OBH; however these were not large enough to be considered significant [$F(1,58) = 2.98$, $p = 0.090$ for OBH Gender Main effect]. None of the TAU participants, male or female were at or below the clinical cut off at Time 2 (see Table 2).

3.2.2. Race

Due to low numbers of youth in this study whose race was other than Caucasian for this study, we collapsed all the Non-Caucasian youth into one group (See Table 2). Based on the findings for both the OBH and TAU groups, there were no significant main effects for Race or significant interaction effects for Time x Race, suggesting that youth improved significantly from Time 1 to Time 2 regardless of race. For the OBH group, only the Non-Caucasian group was reported by parents to have a mean Y-OQ 2.01 Total score below the clinical cut off at Time 2.

3.2.3. Age

Age was collapsed into two groups. One group was youth "Younger than 16" and another group was youth "16 or older". Table 2 shows the mean Y-OQ 2.01 scores from parents for youth across age groups at Time 1 and Time 2. For both the OBH and TAU group there were no

Table 3
OLS regression estimates of change in YOQ from Time 1 to Time 2 controlling for treatment condition, age, gender, ethnicity, and Y-OQ 2.01 at Time 1 ($N = 120$).

	B	*b*	*SE*	*t*	*p*
Caucasian (Non-Caucasian = 0)	0.03	3.21	8.86	−0.36	0.72
Age at intake/inquiry	0.05	1.64	2.87	0.57	0.57
Gender (Female = 0)	−0.03	−3.10	7.46	−0.42	0.68
Time 1 Y-OQ 2.01	0.41	0.64	0.12	5.26	< 0.001
OBH (TAU = 0)	−0.40	−36.08	6.96	−5.18	< 0.001

$F(5, 114) = 10.89$, $p < 0.001$; $R^2 = 32.2$; *Adjusted* $R^2 = 29.4$.

significant main effects for Age or significant interactions between Time x Age, suggesting that youth significantly improved across time regardless of age. It is interesting to note that younger youth in the OBH group were more acute than older youth in the OBH group, with the opposite true for the comparison group's mean Y-OQ 2.01 scores at Time 1 and only the youth in OBH treatment that were 16 or Older had Y-OQ 2.01 scores reported from their parents below the clinical cut off at Time 2.

3.3. Predictors of Y-OQ change

An ordinary least squares regression analysis was performed to see if participation in OBH was a significant predictor of change (see Table 3). Y-OQ 2.01 total scores at Time 1 and OBH participation were the only two significant predictors of Y-OQ 2.01 scores at Time 2. In fact, youth who participated in OBH had 36 points of change greater than youth. In addition, this regression model accounted for 29.4% of the variances in Time 2 Y-OQ 2.01 total scores, suggesting that almost one third of the variance in Time 2 scores can be accounted for by this model.

4. Discussion

4.1. Intake/inquiry to one-year post

The current study found that treatment in an OBH program decreased symptomology for adolescents at one-year post treatment as reported by their parents. Clinically and statistically significant improvements were reported by parents of youth in both the OBH group and the TAU group. However, the gains in the OBH treatment group were significantly greater than the TAU comparison group, almost three times larger in fact. These results support the idea that this OBH interventions served the participant better in the “long run” than community interventions. The comparison group scores at Time 2 suggest that participants were likely in need of more intensive services one year later after inquiry into OBH treatment.

These findings support previous research on OBH which reported significant overall improvements for youth at 6–12 months post treatment (Clark et al., 2004; Combs et al., 2016; Tucker, Paul, et al., 2016; Zelov et al., 2013). In fact, recent meta-analyses have shown significant effect sizes in outcomes studies examining OBH (Bettmann, Gillis, Speelman, Parry, & Case, 2016; Gillis et al., 2016). Specifically, Gillis et al. (2016) found in their meta-analysis larger effect sizes for Y-OQ 2.01 parent reports for youth in wilderness programs compared to Y-OQ 2.01 reports for parents with youth in non-wilderness programs. Hence, this current study with its incorporation of a comparison group adds an additional layer to this foundational research, building a stronger argument for the effectiveness of OBH interventions.

4.2. Gender, race and age comparisons

4.2.1. Gender

Parents in this study reported that their daughters entering OBH treatment were more acute than males, which was consistent to previous research and parent reports (Tucker, Paul, et al., 2016) as well as youth self-reports (Tucker, Zelov, & Young, 2011). In addition, similar to previous research, in this study the difference between males and females post treatment in their functioning was no longer significant (Tucker et al., 2011; Tucker, Paul, et al., 2016). Meaning, it appears that both males and females experienced significant changes during treatment. This information may help encourage an increase in female participation in OBH settings which have traditionally served more males than females and help overcome gender differences seen in those who receives OBH treatment (Tucker et al., 2014).

Further, the current study found that according to their parents, males who attended OBH were more likely to experience improvements in mental health functioning that were below the clinical cut-off at one-year post-discharge, whereas females were not. Both however had the same level of improvement of reported improvement. Tucker, Paul, et al. (2016) found that the parents of females who attended OBH programs reported their daughters to be reporting at or below the clinical cut-off at discharge, but these levels decreased at 6 months post treatment which was different than the males in the study whose improvement remained steady. It may be that both genders experience improvement in diverse ways and may require different levels of follow-up services in order to retain gains past the one-year follow-up (Tucker, Paul, et al., 2016). In addition, relationships between youth and their parents may change over time as the family dynamics are explored and unpacked in the therapeutic process, which may also impact parent perceptions of their child's functioning (Tucker, Paul, et al., 2016). Clearly more research is needed to better understand the role that gender plays in OBH treatment, what needs may be different based on gender and how this may impact the family dynamics over time.

4.2.2. Race

Parents in the study reported no significant differences between the Caucasian and Non-Caucasian youth. Caucasian and Non-Caucasian youth receiving TAU had reported prominent levels of clinical distress at Time 2; while both groups receiving OBH saw significant change at Time 2. However, only the Non-Caucasians in the OBH group has mean Y-OQ 2.01 scores below the clinical cut off one-year post treatment as reported by their parents. Similar to being mostly male, the wilderness setting has been traditionally dominated by Caucasian youth, as seen in the current study. Our results suggest that while Caucasian youth have historically had greater access to OBH interventions, the outcomes of OBH may be able to meet the needs of more diverse youth. To date, no other research has looked at the role of ethnicity on changes in OBH youth; however, one study found better rates of reduction in problem areas for African American clients in a community-based adventure therapy setting compared to their Caucasian peers (Tucker, Javorski, Tracy, & Beale, 2013). Yet, like previous studies, our study is quite limited by the small number of Non-Caucasian youth which minimizes the generalizability of and our confidence in the findings for the Non-Caucasian youth. More research with larger groups of diverse participants is needed to truly understand if OBH impacts racially and ethnically diverse youth differently.

4.2.3. Age

The current study found that all OBH participants according to their parents, regardless of age, experienced significant improvements from intake to one-year post discharge regardless of age. Yet, only the older adolescents who attended OBH had mean Y-OQ 2.01 scores as reported by parents that were below the clinical cut-off at Time 2. This is similar to previous research that has noted age to be related to participant outcome. Bowen and Neill (2013) in their meta-analysis of 197 studies on adventure therapy, most of which were private pay wilderness programs in the United States, found age to be a significant predictor of outcomes with older participants reporting larger improvements than younger participants. Hence, best practices for OBH programs may in fact need to look at age and specifically at what age might OBH be most effective for youth or perhaps what practices may need to adapt

depending on the developmental stage of the youth.

4.3. Predictive factors

The current study found that despite some differences in race, age, and gender as shown by the ANOVAs, the only predictors of meaningful change at Time 2 were that participants were experiencing some level of clinical distress at intake/inquiry and that they engaged in an Outdoor Behavioral Healthcare intervention. These findings build upon previous research supporting the idea of OBH as a viable alternative to traditional methods of intervention regarding mental health and substance use issues and increase support of OBH as an evidence-based practice.

5. Limitations

Despite the promise of our findings, there are several limitations important to recognize. A common limitation of research in OBH is the lack of a comparison group in treatment studies as well as a lack of follow up data on participants after they leave treatment. This study aimed to address both gaps; yet randomization of treatment conditions was not possible for this study due to ethical and logistic constraints (Gabrielsen, Fernee, Aasen, & Eskedal, 2016). Despite the OBH and TAU groups being similar based on levels of mental health functioning at Time 1, gender, age and ethnicity, there may have been additional differences between the OBH and the TAU group not necessarily measured in this study. This study did not look specifically at differences in diagnosis or family structure. In addition, the reasons why parents did not place their children in the OBH program in this study is unclear. One of the likely factors may be the financial costs of OBH treatment. The OBH program in this study is mostly funded by private pay and families with a higher socioeconomic status may have been more likely to send their child to OBH than those in lower income brackets. Attrition is also an issue due to the fact that only 27% of the sample of parents who agreed to participate as part of the TAU group were included in the study. Some agreed to participate but did not complete data at Time 2; other parents sent their youth to other private pay programs, and some of the youth were not between 12 and 17. Regardless, without doing additional analysis between participants and non-participants in the study across a variety of domains including socio economic status, family structure and diagnosis, it is unclear if the 140 youth who were not included, were in some way tangibly different than those who remained; hence limiting our confidence that change was due to OBH participation and not due to other factors.

Another area of limitations has to do with the interventions received by each group. There was limited information collected regarding the services the TAU group received in their communities. We know the TAU group received individual therapy, family therapy, and various psychiatric services; however, the details of the services are limited. For example, information about the treatment modalities used in the individual and family therapy, the types of medications prescribed, and the completion rate is unclear in the TAU group. The difference in treatment “dosage” may also be a limiting variable in comparing the OBH and TAU group. Participants in the OBH group received regular individual therapy, group therapy, family therapy and medication management. While those in the TAU group only received some of those services. Additionally, the treatment group received the additional benefits of being in an OBH program which includes extended backcountry travel, the wilderness living experiences, continuous group living with peers, regular formal and informal feedback from peers, and the benefits of the various adventure experiences. The TAU group would not likely have equivalent treatment experiences within the community treatment services; hence an expectation of improvement may be limited. Thus, when interpreting the findings of this study the limitations of the TAU group should be considered and that there may have been more inherent differences between the groups which hence impacted the outcomes.

In addition, OBH as a field is still unclear what specific components of the intervention produce changes in participants. The identification of elements in OBH programming responsible for the changes continue to be based more on professional judgment and experience rather than statistical validation. Only recently has research begun to focus on this issue. Russell and Gillis (2017) have created and validated the Adventure Therapy Experience Scale (ATES), identifying the factors of Group Adventure, Challenge, Reflection, and Nature, as key components of change in adventure and wilderness therapy; components shown to be directly related to changes in mental health functioning of clients (Russell & Gillis, 2017). Russell, Gillis, and Kivlighan (2017) found that increased levels of mindfulness and group adventure reported by participants involved in an adventure therapy experience were directly related to decreased Y-OQ scores and lower mental health dysfunction. This research is only the beginning and future research is needed to continue to explore and better articulate the components of OBH that promote change in clients.

This study is also limited as it does not represent OBH as a field, but findings from one specific OBH program among many. Due to this, these findings may not be generalized to all wilderness programs. Similarly, this study's validity is limited due to its reliance only on parent reports without triangulation from youth or staff and/or clinicians. In fact, Smith (2007) explored the issues around multiple informants in research with adolescents and stressed that parent reports should be weighted more heavily than self-report for youth requiring inpatient care. In addition, recent research on OBH using the Y-OQ with both parent and youth found parents to report higher levels of dysfunction at intake for their children; however, these differences were not present at discharge or post-discharge, suggesting that youth minimize their acuity at intake, but have a similar understanding of their mental health functioning as their parents after the treatment process (Tucker, Paul, et al., 2016). Hence, while multiple informants would be ideal, we did not have the resources to pursue this, and since there was evidence in the literature that parent reports be weighted above youth self-reports, we pursued parent reports for our study. Clearly, future research needs to focus on multiple informants to increase the reliability and confidence in the findings.

6. Conclusion

As mental health and substance abuse problems in adolescence are increasing and behavioral health treatments are becoming more complex, it is important that research be invested in exploring alternatives to clinical treatment interventions. The current results strengthen an area of OBH research that has been long called for by including a comparison group (Becker, 2010; Clark et al., 2004; Gass, Gillis, & Russell, 2012; Norton et al., 2014). Randomized control trials (RCTs) have traditionally been considered the gold standard of comparison group designs (Shadish, Cook, & Campbell, 2002). However, various ethical, practical, and empirical issues have been identified as major obstacles in the assumption that RCTs are the only appropriate and meaningful method of studying efficaciousness in an OBH setting (Gabrielsen et al., 2016). The current study demonstrates that alternative research methods (e.g. treatment as usual) can be considered in an OBH setting, and highlights areas for future research areas that can add to its foundation. This information could be helpful in educating consumers, seeking insurance reimbursement, securing funding for research, improving reputation in the healthcare field, and advocating for OBH as an evidence-based intervention.

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Declaration of interest

Brett Talbot is an employee of RedCliff Ascent. Brett Talbot was not a part of the data collection or data analysis. Brett only contributed to the writing of the introduction and discussion sections. Steven DeMille is an employee of RedCliff Ascent and is responsible for supervising program research. Steven was part of the data collection through sending email reminders to participants to complete online surveys and questionnaires. Steven was not involved in the data analysis or reporting.

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