Relaxation and Guided Imagery for Parents of Offspring with Developmental Disabilities

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Abstract

This pilot study employed a randomized control trial that tested a relaxation and guided imagery (RGI) intervention on self-perceptions of state and trait anxiety, depression, sleep quality, and stress. Parents of offspring with developmental disabilities have been shown to have higher levels of stress than parents of typically developing offspring. This study was designed to meet the National Center for Complementary and Integrative Health (NCCIH) conceptual framework, which encourages early studies to demonstrate a measurable effect of an intervention prior to designing a large-scale study. It is thus intentionally small in scale. Participants were recruited through social media advertisements posted through health and disability-related organizations. Forty-two people responded to recruitment materials, 20 participants began the study and 14 completed the study. Results showed decreased scores on levels of state and trait anxiety (State Trait Anxiety Inventory), depression (Beck's Depression Inventory) and stress (Perceived Stress Scale-10) for the treatment group with improvements across both groups in sleep quality (Pittsburgh Sleep Quality Index). The sleep quality measurement was confounded by sleep medication use that was not measured in detail in this study. Further, participants rated the RGI intervention positively on a consumer satisfaction scale. Limitations and directions for future research are discussed, such as alterations to dependent variable completion timing.

Keywords: Relaxation; Guided imagery; Developmental disabilities; Parents; Stress; Anxiety; Depression; Sleep quality

Introduction

The purpose of this research was to examine the effectiveness of a previously studied Relaxation and Guided Imagery intervention [1] on state and trait anxiety, depression, sleep quality and stress in parents of offspring with developmental disabilities (DD). The current prevalence rate of developmental disabilities is 1 in 6 [2]. The RGI intervention has been effective at decreasing stress, fatigue, pain and depression for varied types of participants and conditions, including those with fibromyalgia and asthma [1]. RGI's effects have been further supported, not only by subjective indices, but also biological markers in that decreases in salivary cortisol levels have been observed [3].

Life stressors can lead to production of stress hormones in the body and subsequent poor health. A stressor such as the number of work days compared to vacation days is associated with an increase in the production of the stress hormone cortisol in humans [4]. Stress has also been associated with fatal diseases such as cancer [5]. Within ovarian cancer, "A one standard deviation increase in night cortisol was associated with a 46% greater likelihood of death" [6]. There are therefore, serious health ramifications to living a stressful lifestyle.

Internationally, parents of children with DD, particularly Autism Spectrum Disorder (ASD), experience high levels of stress [7,8]. This is true for both mothers and fathers, with fathers' stress also being correlated with the severity of ASD symptomology [8]. Parent stress is also related to poor sleep quality for parents of children with DD [9]. Hayes and Watson conducted a meta-analysis of studies that investigated parenting stress for those who have typically developing offspring, offspring with ASD, and offspring with other disabilities. They found substantially greater stress in parents of children with ASD compared to typically developing counterparts and to those with other disabilities. The authors stated that this, "suggests that parenting stress in families with a child diagnosed with ASD is a significant experience that warrants attention and intervention. Finding ways to moderate or mediate parenting stress may facilitate a family's functioning" [10].

Interventions studied for improving mental health variables for parents of children with DD include Mindfulness Based Stress Reduction (MBSR), problem solving education, and cognitive behavior therapy. MBSR is associated with significant reductions in perceived stress, parental stress and well-being [11] and problem solving education is associated with reductions in parental stress and mean maternal depressive symptoms [12]. However, MBSR requires expensive and extensive training for the trainer and can also be time intensive for the participant (i.e., eight 2 h sessions at a remote location) [11]. Problem solving education, while less time and expense intensive than MBSR, requires 6 individual 30 min sessions with trained research staff [12]. It is therefore not an intervention that can be completed without professional training and numerous individual time commitments. Group-delivered cognitive behavior therapy has also been used with moderate success to reduce stress for parents of children with developmental disabilities [13], but this also requires remote location meetings and thus presents scheduling difficulties. Given the vast respite care needs of parents of children with DD [14], it is not always feasible to plan stress-reduction interventions that further impose extra time and scheduling demands on these already stressed parents. Abelson investigated the respite care needs of parents of children with DD and found, "a void in the availability and accessibility of respite services regardless of demography, income level, or extent of disability". Therefore, since these parents have limited time resources and the knowledge that parental stress is malleable by intervention and damaging to health, it is important to investigate the effects of an intervention for parents of children with DD that is known to reduce stress while being cost effective and time efficient to implement. The purpose of this study was to investigate whether a cost-effective and time efficient delivery of an RGI intervention would positively impact perceptions of anxiety, depression, sleep quality and stress for parents of children with developmental disabilities.

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Methods

Study design

This study used a two-group pre-test post-test randomized experimental design to examine the effectiveness of guided imagery on state and trait anxiety, depression, sleep quality and stress in parents of offspring with developmental disabilities (DD).

Participants

Participants were recruited using flyers and social media and website postings through health and disability-related organizations affiliated with the University of Connecticut Health Center over a one-month period. Inclusion criteria included (a) parent of a person with DD, (b) age ≥ 18, (c) an ability to understand English, (d) signed consent form, and (e) willingness to complete the study questionnaires. A total of 42 potential participants inquired about the study. Of the 42 inquiries, 41 individuals met inclusion criteria. Of those, 21 individuals were eligible but chose not to participate or failed to complete the study participation requirements (i.e., attend an initial meeting). A total of 20 participants met the inclusion criteria and consented to participate in the study (Figure 1). The study protocol was approved by the Institutional Review Board (IRB) of the University of Connecticut Health Center.

Measures

State–trait anxiety inventory (STAI): The STAI has two forms: one on State anxiety (i.e., current anxiety) and one on Trait anxiety (i.e., generic and consistent anxiety characteristics). State anxiety questions pertain to current states of being and trait anxiety questions relate to on-going traits of anxiety. All items are rated on a 4-point scale (e.g. from "Almost Never" to "Almost Always"). Higher scores indicate greater anxiety. Each form contains 20 items and every item has a weighted score between 1 and 4, with 4 being associated with high anxiety on approximately half the items. Following weighted scoring, the range for both forms is 20 to 80, with higher numbers associated with greater State or Trait anxiety. Internal consistency Cronbach's alphas range from 0.86 to 0.95 [15]. Content validity is also strong when compared to the Taylor Manifest Anxiety Scale (r=0.73) and the Cattell and Scheier's Anxiety Scale Questionnaire (r=0.85) [16]. The State anxiety scale measured participants' self-perceptions of anxiety in their lives before and after the intervention.

Beck's Depression Inventory–II (BDI–II): Perception of depression was measured using the BDI-II. The BDI-II contains 21 items with scores that range from 0 to 63. Scores of 0 to 13 are in the Minimal range; 14 to 19 are in the Mild range; 20 to 28 are in the Moderate range; and 29 to 63 are in the severe range. It has adequate reliability (α=0.92) and convergent validity (r=0.93 with the BDI-IA and r=0.71 with the Hamilton Psychiatric Rating Scale for Depression) [17].

Pittsburgh sleep quality index (PSQI): The PSQI is a self-report measure with 19 items that ask about sleep quality over the past month [18]. Respondents indicate the amount of sleep they obtained and rate the extent to which various factors interfered with their sleep on a four-point Likert-type scale (0=not at all, 3=three or more times a week). These items yield scores on seven subscales: subjective sleep efficiency, sleep latency, sleep duration, sleep quality, sleep disturbance, sleep medication use and daytime dysfunction due to sleepiness. The subscales yield a score from 0 to 3 and are summed to yield a total score ranging from 0 to 21, with higher total scores indicating poorer sleep
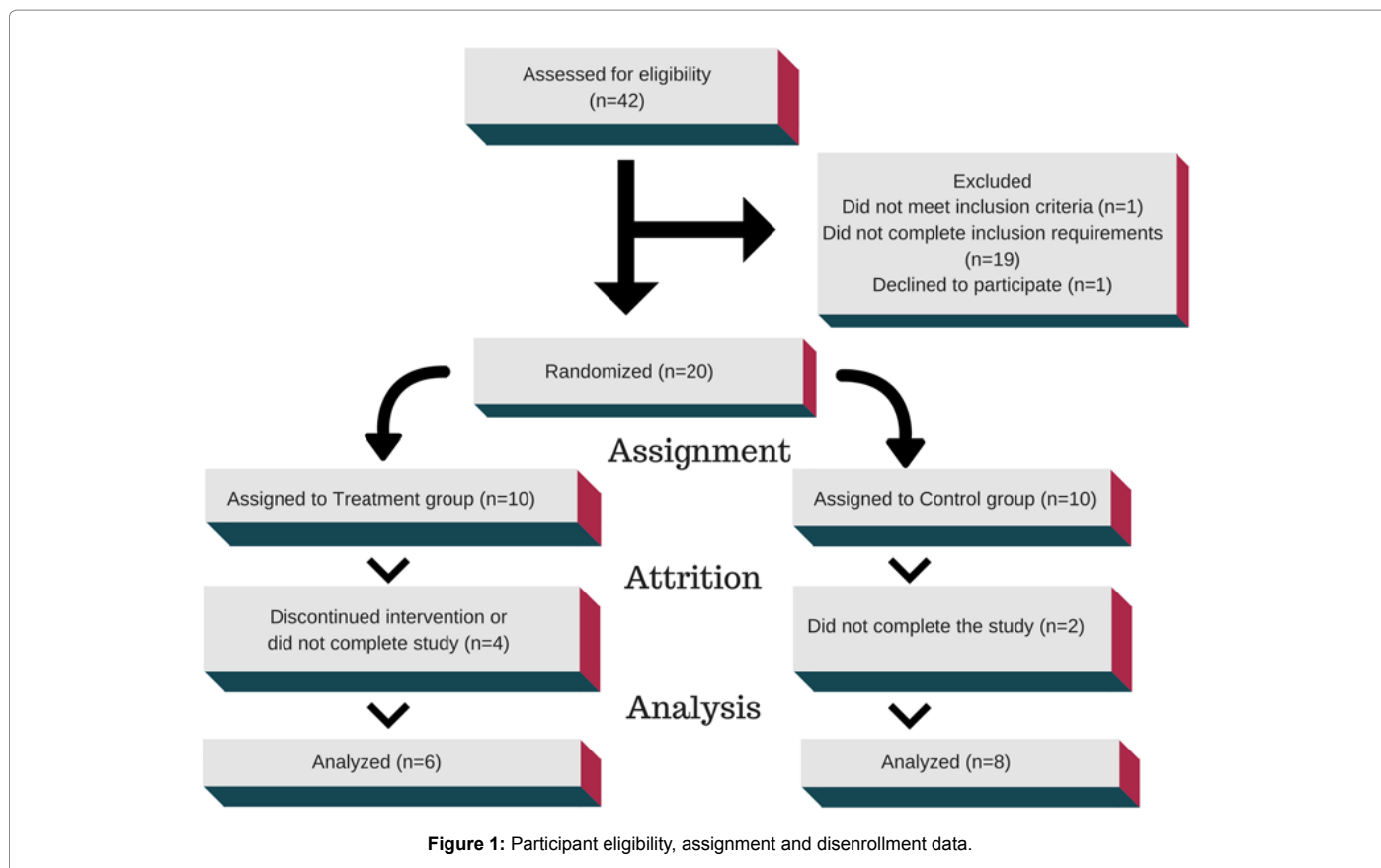

Figure 1: Participant eligibility, assignment and disenrollment data.

quality [19]. Scores greater than 5 are affiliated with poor sleep quality. Cronbach's alpha for the global score has been reported as 0.80; analysis indicates that the global score is the best score to use to reflect sleep quality, sleep latency, and habitual sleep efficiency. Content validity is strong (r's=0.69 to 0.77) [20].

Perceived stress scale–10 (PSS–10): Perception of stress was measured with the 10-item PSS. The PSS is comprised of 10 items that respondents rate on a 5-point scale (0=never to 4=very often). Scores range from 0 to 40, with higher scores indicating higher perceived stress. The 10 questions are general in nature, with respondents indicating how often each statement applied to them during the past month. The reliability (α=0.78) of the PSS-10 is adequate and greater than the PSS–14 and the PSS–4 [21].

Disabilities participant satisfaction scale: Following the intervention phase of the study, treatment group participants completed a post-test rating scale developed by the authors of this research to assess treatment acceptability. The scale contained six items using a Likert response scale with five points and a neutral midpoint. The questions related to ease of using the intervention and likelihood of using it again or recommending it to others.

Procedure

This was designed as a pilot study to determine if a clinically meaningful signal could be measured on the use of RGI. This is based on the National Center for Complementary and Integrative Health (NCCIH) conceptual framework which states, "the initial stage in the conceptual framework is to determine whether the intervention of interest can demonstrate a biologically and/or clinically meaningful and measurable effect when employed...This is an initial assessment to determine whether the potential impact of the intervention is strong enough to warrant investment in further research on the specific indication that was assessed" [22].

This pilot study used a two-group pre-test post-test randomized experimental design with one independent variable (RGI) and five dependent variables (anxiety, depression, sleep quality, stress and consumer satisfaction). Potential participants who contacted the lead researcher and elected to attend one of the group introductory meetings of the study were briefed on the purpose of the study at the initial meeting. After consent and enrolment, study participants were randomized with equal probabilities into the treatment (RGI) group or control (no RGI) group. Randomization was completed using a participant roll of a die. All participants then completed the State-Trait Anxiety Inventory (STAI), Beck's Depression Inventory-II (BDI-II), Pittsburgh Sleep Quality Index (PSQI) and Perceived Stress Scale-10 (PSS-10). Participants randomly assigned to the control group were then given oral and written instructions to live their lives as they normally would and to return for the second meeting of the study in six weeks. They were advised that they would gain access to the RGI recordings at that time. After the control group participants left the meeting, the treatment group participants were instructed on how to access the RGI recordings on their smart phones. The recordings were housed on a dedicated, study-specific website with three distinct links labeled, "Track 1," "Track 2" and "Track 3." The researcher ensured all treatment participants were able to independently access the recordings on their smart phones. They were then instructed to listen to Track 1 daily for 2 weeks, Track 2 daily for 2 weeks and Track 3 daily for 2 weeks. Each track was less than 20 minutes in length. Track 1 was a basic relaxation script intended to familiarize study participants with imagery and enhance ability to relax in any setting. It included

instructions for guided relaxation to decrease tension and enhance overall wellbeing. Track 2 of the intervention series was a pleasant scene imagery script instructing study participants to feel increasingly well within a pleasant scene of their own choosing. In this imagined place of wellness, sensory involvement was encouraged by instructing participants to become familiar with signs, sounds, smells, feelings associated with their pleasant place and to emerge from the imagery feeling refreshed, relaxed and rejuvenated. Track 3 was an imagery script that guided the participant through their immune system for purpose of balancing their physical wellbeing with their psychological wellbeing. Participants were instructed to imagine themselves in a place of safety and security while their immune system restored itself to its normal state of wellbeing (i.e., homeostasis) and to emerge from the imagery, once again, feeling refreshed, relaxed and rejuvenated. The goal of Track 3 was to bring the participants to the end state of living with an enhanced sense of wellbeing. To assess for adherence to the intervention, study participants were given a daily log to record the date, which track they listened to that day, and to record comments as desired. Participants were told they could listen to the recordings at any time of the day or night. They were also told that if they missed a day, they should note that in the log and simply continue the typical schedule the next day as opposed to listening to two tracks on the next day. The researcher then played Track 1 in its entirety for the treatment group participants in the initial meeting so they would know what to expect as well as to assess for potential abreaction to the relaxation condition. Finding that there were no negative responses to the relaxation imagery script, the baseline data collection session ended after any participant questions regarding study protocol were addressed as needed.

All participants were contacted by the lead researcher to schedule a second study meeting at the conclusion of the 6 week study. At the second meeting, all participants completed the same four scales that were completed at the baseline data collection meeting. The treatment group participants also completed a consumer satisfaction scale and turned in their daily logs. All participants were thanked for their participation and control group participants were then given access to the RGI recordings for their future use. This included written instructions on where to access the recordings on the secured internet site dedicated specifically to this study.

Data Analysis Strategies

As a pilot study, the number of participants is purposefully small to allow for initial analysis of the intervention with this population and determine initial support for larger-scale studies. Descriptive statistics were the primary method of analysis as suggested by several research teams [23-26]. An analysis of the response rate and persistence was also conducted to provide an indication of the effectiveness of the recruitment methods.

Descriptive statistics were run for all variables to provide initial analysis of potential effects of the Relaxation and Guided Imagery intervention. For each variable, the mean and standard deviations for each group were also compared across the two time points. The means for each group were also graphed for each time point to provide a visual indication of any changes in participants over time.

Results

Of the 20 individuals enrolled in the study, six participants withdrew (four in the treatment group; two in control group) leaving 14 participants who completed the study. The overall, treatment, and control group mean scores and standard deviations on the dependent

variables at baseline are represented in Table 1. There were minor differences of initial means across most dependent variables except trait anxiety, which evidenced a difference of 8.9 points between treatment and control initial means despite true random assignment methods.

Anxiety

State anxiety

On the measure of state anxiety, the control group evidenced slight improvement and the treatment group showed greater improvement over the course of the study. The mean difference between treatment and control groups at the start of the study on state anxiety was 1.5. The control group mean STAI State Anxiety score decreased by 1.2 points and the treatment group decreased by 6.6 points. Visual results are depicted in Figure 2.

Group	Anxiety-State	Anxiety-Trait	Depression	Sleep Quality	Stress
	(STAI)	(STAI)	(BDI-II)	(PSQI)	(PSS-10)
	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
Overall (5.15)	58.35 (12.97)	61.85 (10.35)	13.70 (7.60)	9.20 (3.25)	22.85
Treatment (5.43)	59.10 (12.89)	57.40 (9.67)	12.40 (5.41)	9.00 (2.61)	21.10
Control (4.18)	57.60 (13.02)	66.30 (9.00)	15.00 (9.10)	9.40 (3.77)	24.60

Note: STAI: State-Trait Anxiety Scale; BDI: Beck Depression Inventory; PSQI: Pittsburgh Sleep Quality Index; PSS: Perceived Stress Scale; M: Mean; SD: Standard Deviation

Table 1: Baseline mean scores across all participants, treatment group and control group on dependent variables.
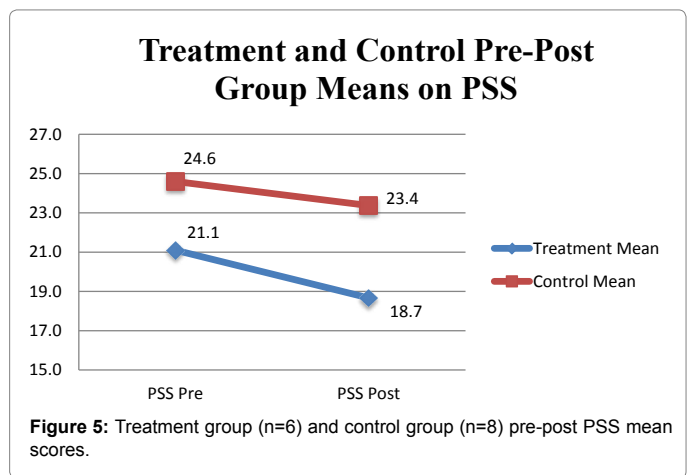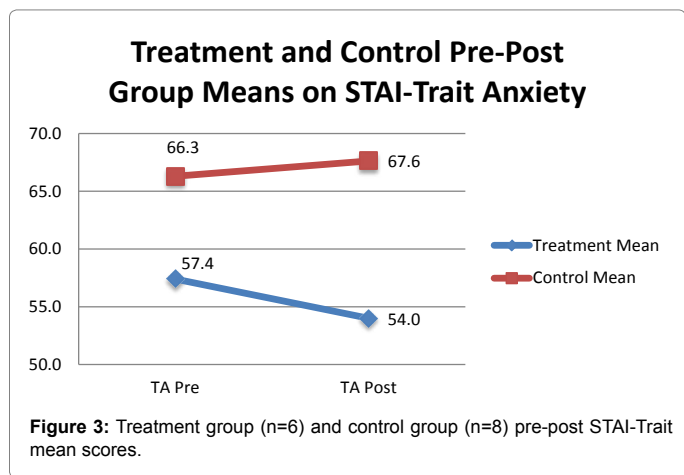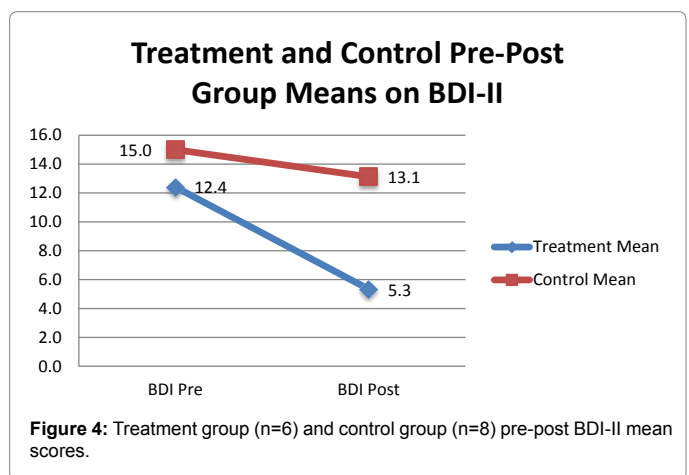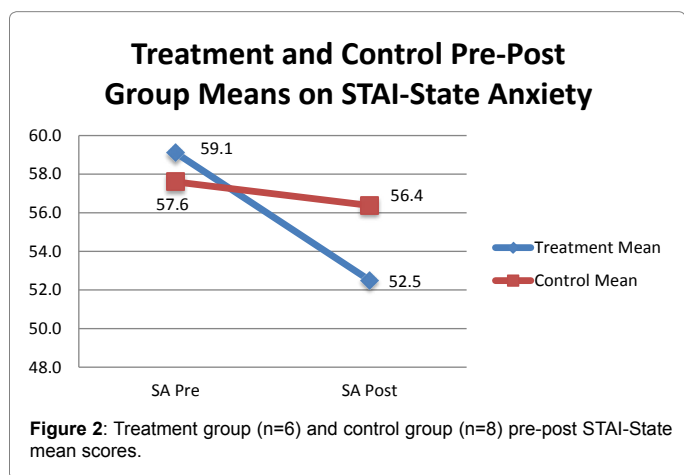
Trait anxiety

For trait anxiety, the absolute value difference of means between treatment and control groups at the start of the study was 8.9, despite random assignment to groups. The control group mean on the STAI-Trait Anxiety worsened slightly over the course of the study, with an increase of 1.3 points. The treatment group demonstrated improvement on trait anxiety with a decrease in mean score of 3.4 points (Figure 3).

Depression

The treatment group evidenced more positive changes in perceptions of depression than did the control group over the same period. Initial absolute value difference between treatment and control group means was 2.6. Following the treatment phase, the control group mean on the BDI-II decreased by 1.9 points and the treatment group mean decreased by 7.1 points. See Figure 4 for visual representation of the BDI-II group results. Visual analysis shows a more profound decrease in perceptions of depression following the treatment phase for the treatment group than the control group.

Perceived stress

Both groups also evidenced positive change in perceptions of stress, with the treatment group again evidencing greater change. Initial absolute value mean difference between treatment and control groups on stress was 3.5. Following the treatment phase, the control group mean on the PSS declined by 1.2 points and the treatment group mean reduced by 2.4 points (Figure 5).

Figure 2: Treatment group (n=6) and control group (n=8) pre-post STAI-State mean scores.

Figure 4: Treatment group (n=6) and control group (n=8) pre-post BDI-II mean scores.

Figure 3: Treatment group (n=6) and control group (n=8) pre-post STAI-Trait mean scores.

Figure 5: Treatment group (n=6) and control group (n=8) pre-post PSS mean scores.

Sleep quality

Results of the PSQI showed improvements in both groups on sleep quality perceptions. The control group evidenced slightly better improvements with a mean score decrease of 3.0 points compared to 2.0 in the treatment group (Figure 6).

Participant satisfaction

The final dependent variable measured was consumer satisfaction with the intervention by the treatment group (n=6) using a 5-point Likert scale with six questions. All questions received a mean score above 4.25 with the exception of, "I will use these recordings on my own now that the study is done," which received a mean score of 3.5 (Figure 7).
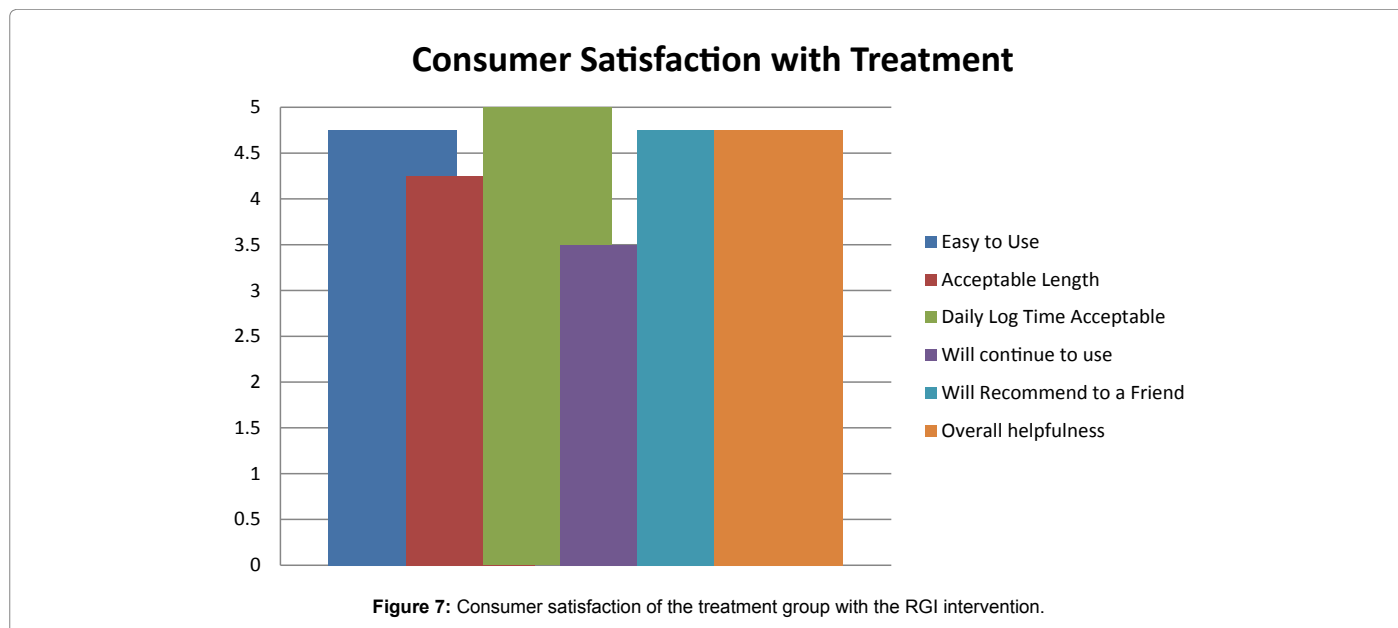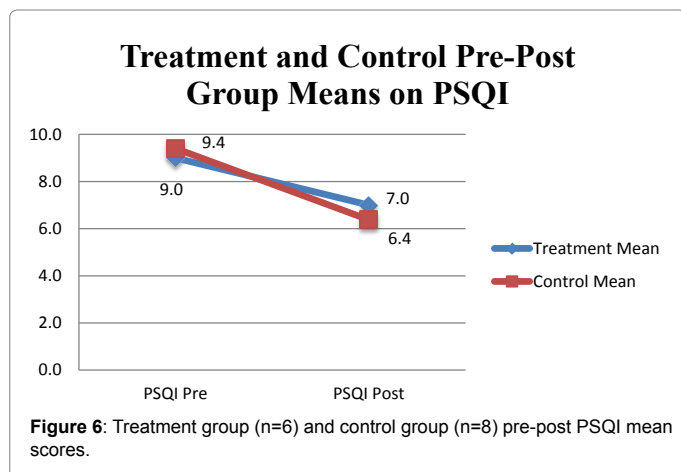
Discussion

The results of this study are informative about the general characteristics of the participants and the effectiveness and ease of use of the RGI intervention with parents of offspring with DD. As an overall group, there was evidence of poor sleep quality among parents of offspring with DD since 19 out of 20 participants scored in the "poor

sleep quality" range at the beginning of the study (one participant in the control group scored in the "good sleep quality" range). Study findings demonstrated a slight improvement in sleep for the control group as compared to the treatment group. However, it is also interesting to note that 3 out of 6 treatment group participants yielded scores in the "good sleep quality" range at the end of the study and 3 out of 8 in the control group also scored in the "good sleep quality" range.

For state and trait anxiety, study participants scored two standard deviations above the working adult means of the STAI at the beginning of the study. The state anxiety working adult mean is 35.72 (10.4) and trait anxiety working adult mean is 34.89 (9.19) [15]. Further, the participants' mean perceived stress score of 22.85 (5.15) was more than a standard deviation above the adult female mean of 13.7 (6.6) and adult male mean of 12.1 (5.9) [21].

When examining the means and standard deviations for each dependent variable, both the treatment and control groups demonstrated positive changes on scores for state anxiety, depression, sleep quality and stress; however, scores on state anxiety, depression and perceived stress demonstrated higher levels of improvement for the treatment group as compared to the control group. Regarding trait anxiety and sleep quality scores, there are two notable, and somewhat confounding, study findings regarding this study sample. Trait anxiety scores for the control group worsened from baseline to 6 weeks. Recalling that at baseline the two groups differed by 8.9 points, with the control group evidencing higher trait anxiety scores than the treatment group, we remain unable to discern precisely why such a discrepancy in this specific study finding would present itself. Even with the potential influence of non-specific effects of trial participation, i.e., the Hawthorne Effect [27] on outcomes in either group, we are unable to determine if the higher trait anxiety scores in the control group at baseline were related to the fact that there may have been individuals in the control group experiencing higher on-going traits of anxiety than individuals in the treatment group. Alternatively, perhaps there may have been external events, or unseen stressors, related to the role as a parent of a child with DD that influenced their level of trait anxiety [28]. One other possibility may be that study participants randomly assigned to the control group would have preferred to be in the treatment group. For example, study participants randomly assigned to the control group

Figure 6: Treatment group (n=6) and control group (n=8) pre-post PSQI mean scores.

Figure 7: Consumer satisfaction of the treatment group with the RGI intervention.

verbally expressed disappointment to the investigator that they had not been assigned to the treatment group. It is possible that hope for receiving the intervention was the motivation for agreeing to become a study participant and that by not receiving the treatment right away, a sense of disappointment influenced perceptions of anxiety.

However, one would expect to see greater changes in state anxiety rather than trait anxiety in such an instance. This should be monitored in future studies.

Although both groups showed improvement in sleep quality, it was the control group who demonstrated slightly greater levels of improvement. When examining the sleep medication usage item of the PSQI at the start of the study, those in the control group (n=10) reported using sleep medication more often than those in the treatment group (n=10). Specifically, 4 out of 10 participants in the treatment group reported using medication; two noted using it "less than once a week" and two indicated they use it "once or twice a week." In the control group, 5 out of 10 participants reported using sleep medication; one reported "less than once a week," one reported once or twice a week," and three reported "three or more times a week." However, in the current study we did not collection specific medication types and categories. Thus, while it is possible that medication use confounded study findings related to sleep, we suggest that these findings warrant that future studies be designed to more precisely examine potential correlations among variables of sleep quality, stress, anxiety, and non-pharmacologic and pharmacologic treatment strategies in parents of offspring with DD.

Conclusion

In summary, study results are strongly supportive of further study on the use of the RGI intervention for parents of offspring with DD. Use of RGI as a self-administered daily intervention delivered via internet-accessed recordings was effective and feasible with this population. Feedback from participants should be used to refine the recordings for content and preference. In general, however, the recordings as used in this study positively impacted stress, anxiety, and depression in the participants (Figure 7) and further study is highly recommended.

Limitations and Future Directions

Study limitations included small sample size and a seemingly high attrition rate. While this was a pilot study that established a purposeful sample size, it nonetheless limits the conclusions that can be drawn from the results. When assessing the high attrition rate in this small sample size, a clear pattern did not emerge for withdrawal reason. Four members of the treatment group and two of the control group were withdrawn from the study. One treatment group participant reported they forgot to listen to the recordings. Another stated they kept falling asleep during the recordings and so did not think they should attend the final meeting, despite encouragement from the lead researcher to the contrary. The remaining withdrawn participants either did not respond to requests to attend the second meeting or failed to show up for their scheduled meeting. We surmise that those in the treatment group, who had unlimited access to the three RGI recordings from the beginning and throughout the study period, either decided they did not like the intervention, found it untenable to maintain daily use, or liked the recording, had it in their individually owned mobile devices and perhaps determined they would use it as they wished rather than meet the study protocol. Because we did not include in our IRB-approved informed consent a process in which the study participant gave us permission to follow-up with them should they find they could not complete the study, we are unable to address reasons for attrition in both groups. Future studies should include a follow-up protocol to address attrition so as to decrease a risk for biased results

[29]. Regarding attrition of only two individuals in the control group, we hypothesize that the inadvertent incentive of gaining access to the RGI recordings at the second study meeting may have influenced the control group participants to complete the study. Finally, since enrolled geographic proximity to the meeting site differed for participants, it is possible that the time and cost to drive to the second meeting was an obstacle for some participants. Future researchers should consider using another incentive for the treatment group, a financial incentive for all participants to complete the study, or use of the internet or mail to deliver and complete the post-study self-perception scales. These additions to a study protocol may assist with participant retention in both groups.

Beyond this, we recommend that enrolled study participants in future studies complete all study measures prior to receiving their group assignment. We suggest this as a potential method to address any form of emotional reaction to being assigned to a non-treatment control group. It may be that the expressed feelings of disappointment for not having been assigned to the intervention group influenced control group participant perceptions of anxiety, depression or stress when completing dependent variable instruments. Finally, to address the discrepancy in trait anxiety between the treatment and control group scores at baseline and post-test, future researchers may wish to consider developing a protocol that includes collecting data related to the offspring with DD as part of assessing treatment response of the parents who serve as study participants. Incorporating these simple changes has the potential to enhance and improve future research in this area, which is clearly warranted by the results of this pilot study.

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