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An Open Trial of Bedtime Fading for Sleep Disturbances in Preschool Children: A parent group education approach

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ABSTRACT

Study Objectives: To evaluate the efficacy of bedtime fading to reduce sleep disturbances in preschool aged children, using a group parent education format.

Design: A repeated-measures design (pre-treatment, treatment, post-treatment and 2-year follow-up).

Setting: Flinders University Child & Adolescent Sleep Clinic, Adelaide, South Australia

Participants: Participants were 21 children (mean age=3.0±0.80 years, range=1.5-4.0 yrs; 60% girls) identified as having difficulty initiating sleep, night waking, or a combination of both, and their mothers (*M* age=36.1±4.2 years).

Interventions: Mothers attended two group sessions which included basic sleep education (sleep needs, sleep architecture, sleep homeostasis) and bedtime fading instruction.

Measurements and Results: Primary outcome variables were sleep onset latency (SOL), wake after sleep onset (WASO), and bedtime tantrums, measured using 2-week maternal report sleep diaries. Immediate improvements were observed over pre-treatment to treatment in average SOL per night (*M*=23.2±11.3min vs *M*=13.0±7.3min, *d*=0.91), average WASO per night (*M*=32.4±23.1min vs. *M*=24.0±18.3min, *d*=0.41), and number of bedtime tantrums per week (*M*=1.7±3.0 vs. *M*=0.4±0.7, *d*=0.43). Treatment gains were maintained at 2-year follow-up. Mothers rated bedtime fading highly in terms of usefulness and satisfaction, and could successfully re-implement treatment when needed.

Conclusions: Bedtime fading is a brief and promising intervention for pre-schoolers' sleep difficulties. This simple intervention can be easily implemented by parents in the home with little instruction, resulting in improvements to sleep and bedtime tantrums.

Keywords: bedtime fading, pre-schoolers, toddlers, parent education, sleep disturbance, group therapy.

INTRODUCTION

Sleep problems affect many young children, with studies showing between 20-67% of pre-schoolers aged 18 months to 4 years take more than 30 minutes to fall asleep, while between 4-18% take longer than 1 hour (Armstrong, et al., 1994; Hiscock, et al., 2007; Kataria, et al., 1987; Zuckerman, et al., 1987). Problematic night-time waking is also prevalent among preschool children (Mindell et al., 2006), with children frequently requiring the presence of a parent to initiate or reinitiate sleep. Sleep disturbances result in insufficient and fragmented sleep for both children and parents, as well as negative daytime sequelae (Gelman & King, 2011).

Ferber (1999) reported that frustrated and tired parents are often "at the end of [their] tether" by the time they seek professional help. Parents commonly try a variety of treatments and strategies to resolve their children's sleep problems, with some resorting to physical punishment or medication (Armstrong et al., 1998; Ferber, 1999). However, concerns have been raised about the use of sleep medications for preschoolers (Mindell, Kuhn, et al., 2006; Owens, Rosen & Mindell, 2003). Consensus statements for pharmacological treatment of children's sleep problems have recommended that medication only be used after the failure of non-pharmacological treatments, such as behavioural interventions (Mindell, Emslie, et al., 2006; Owens, 2006; Owens et al., 2005).

Bedtime fading involves delaying the child's bedtime to a time at which rapid sleep onset is probable (i.e. slightly later than their natural sleep onset time), whilst maintaining a regular rise time, and age-appropriate naps (Mindell, Kuhn, et al., 2006; Piazza & Fisher, 1991b). It is based upon sleep restriction therapy for adult insomnia (Spielman, Saskin & Thorpy, 1987). The mechanism of action is through the sleep homeostatic system, with sleep pressure heightened by increasing the length of time that children are awake before bed and restricting their opportunity to dissipate this sleep pressure overnight (Borbely, 1982).

Bedtime fading is argued to reduce SOL, night time awakenings, and WASO due to higher sleep efficiency following restricted sleep. The benefit of bedtime fading to sleep parameters has been shown in two small samples including four atypically-developing children with severe intellectual disabilities who were referred to an inpatient unit for treatment of self-injurious behaviour (Piazza & Fisher 1991a) and in infants aged less than 16 months (Gradisar et al., 2016). Bedtime fading has the advantage of being a gentler alternative to 'extinction' methods, which can be distressing for children and parents due to long bouts of crying (Milan, Mitchell, Berger & Pierson, 1981; Ortiz & McCormick, 2007; Rickert & Johnson, 1988). Despite its therapeutic promise, and the stated need for this type of research, there remains a paucity of research evaluating the efficacy of bedtime fading in typically developing preschool-aged children (Meltzer, 2010).

Research advocates behavioural interventions as first line treatment for young children's sleep problems (Mindell, Emslie, et al., 2006; Owens et al., 2005). An American Academy of Sleep Medicine [AASM] review of behavioural treatments for young children's sleep stated that 94% of studies have shown clinically significant results regarding symptom reduction (Mindell, Kuhn, et al., 2006). An accompanying AASM report on practice parameters for behavioural treatments of young children's sleep (Morgenthaler et al., 2006) reviewed the empirical evidence from 52 treatment studies which implement behavioural interventions for bedtime problems and night wakings in infants and preschool children. Studies were graded on the quality of their evidence. Several treatments were recommended. Two treatments, unmodified extinction (which involves putting the child to bed at a set bedtime and then ignoring the child until a fixed time the next morning), and preventative parent education (which focuses on developing good sleep habits by providing education on bedtime routines, consistent sleep schedules, and managing parental involvement during sleep initiation and nighttime awakenings), received a *Standard* recommendation (signifying

a high level of clinical certainty). Four treatments were recommended as *Guideline* treatments, indicating a moderate level of clinical evidence. These included graduated extinction (e.g., "controlled crying," whereby parents ignore bedtime crying and tantrums for specified periods before briefly comforting the child), scheduled awakenings (where parents wake and comfort their child 15 to 30 minutes before the child's typical spontaneous awakening), positive bedtime routines (where parents implement a set bedtime routine involving quiet, pleasant activities) and bedtime fading with response cost. One possible contributor for the *Guideline* assignment (as opposed to *Standard*) for bedtime fading with response cost is the paucity of studies evaluating this strategy in typically developing children. Indeed, only one case study met inclusion criteria for the AASM report (Ashbaugh & Peck, 1998).

Bedtime fading is frequently coupled with an intervention called response cost. Response cost involves removing the child from their bed if sleep is not initiated within a prescribed time, and then re-attempting sleep after a set period (i.e., 15-30min; Mindell, Kuhn, et al., 2006). This treatment component is based upon stimulus control therapy for adult insomnia (Bootzin, 1972), and has its foundation in learning theory (i.e., classical and operant conditioning), with the premise being that the child associates his or her bedroom with sleep and not wakefulness. While both bedtime fading and response cost techniques result in a later bedtime and faster sleep onset (Mindell, Kuhn, Lewin, Meltzer & Sadeh, 2006), response cost is not recommended as a sole treatment for night time waking. Further, there is some contention that response cost may be inappropriate for typically developing children as it reinforces the child's attempts to leave the bedroom environment (Meltzer, 2010). As such, the present study will examine the effect of bedtime fading as a single component therapy.

The present study will add to the limited evidence base for bedtime fading (without response cost) in a sample of typically-developing preschoolers. Based on results found in atypically developing children and infants, we hypothesise that SOL, WASO and bedtime tantrums will decrease from pre-treatment to post-treatment and, further, that treatment outcomes will be maintained at a 2-year follow-up. Based on the AASM practice parameters report (Morgenthaler et al., 2006), possible predictors of treatment outcome, including maternal education, maternal affect (Reid et al. 1999; Armstrong, O'Donnell, McCallum & Dadds, 1998; Gelman & King, 2001; Gregory, Eley, O'Connor, Rijsdijk & Plomin, 2005; Hiscock & Wake, 2001; Meltzer & Mindell, 2007; Warren, Howe, Simmens & Dahl, 2006), and family functioning (Gregory et al., 2005), will be examined to discover for whom the treatment was most efficacious. Mothers' perception of the usefulness of bedtime fading and satisfaction with the treatment will be measured post-treatment to evaluate treatment acceptability.

METHOD

Participants

Participants were 21 children (*M* = 3.0 years, *SD* = 0.8; 13 female, 8 male) who were identified as having a sleep problem, and a parent (*M* = 36.1 years, *SD* = 4.2). Inclusion criteria included: (a) difficulty falling asleep, frequent or prolonged night awakenings, or a combination of both, (b) aged between 18 months and 4 years old, (c) no known or suspected medical reason for their sleep problem, (d) not taking medications known to affect sleep, and (e) identified as typically developing. All parents were Caucasian and could speak, read and write English to a 8th Grade standard. While both fathers and mothers were eligible to participate, our sample was exclusively mothers. Demographic data are given in Table 1. Those excluded from the study were referred to alternative sleep services. Ethics approval

was obtained from the Flinders University Social and Behavioral Research Ethics Committee. Figure 1 shows the flow of participants through the study.

Design

A repeated-measures design was used to examine children's sleep before, during and after the bedtime fading treatment, as well as at 2 years' post-treatment (follow-up). Mothers completed two-week sleep diaries at each time point. Primary outcome variables were sleep onset latency (SOL), wake after sleep onset (WASO), and number of bedtime tantrums. Pre-treatment variables, including maternal education, family disorganisation and maternal depressed mood, anxiety and stress, were examined as predictors of treatment outcome.

Measures

Sleep outcome measure. Parental-report sleep diaries measured children's SOL, WASO, number of awakenings, total sleep time, sleep efficiency and number of bedtime tantrums before sleep onset. Parents were instructed to complete sleep diary entries each day. Sleep diaries are used extensively in sleep research and clinical practice and are the gold-standard for subjective sleep assessment (Buysse, Ancoli-Israel, Edinger, Lichstein & Morin, 2006).

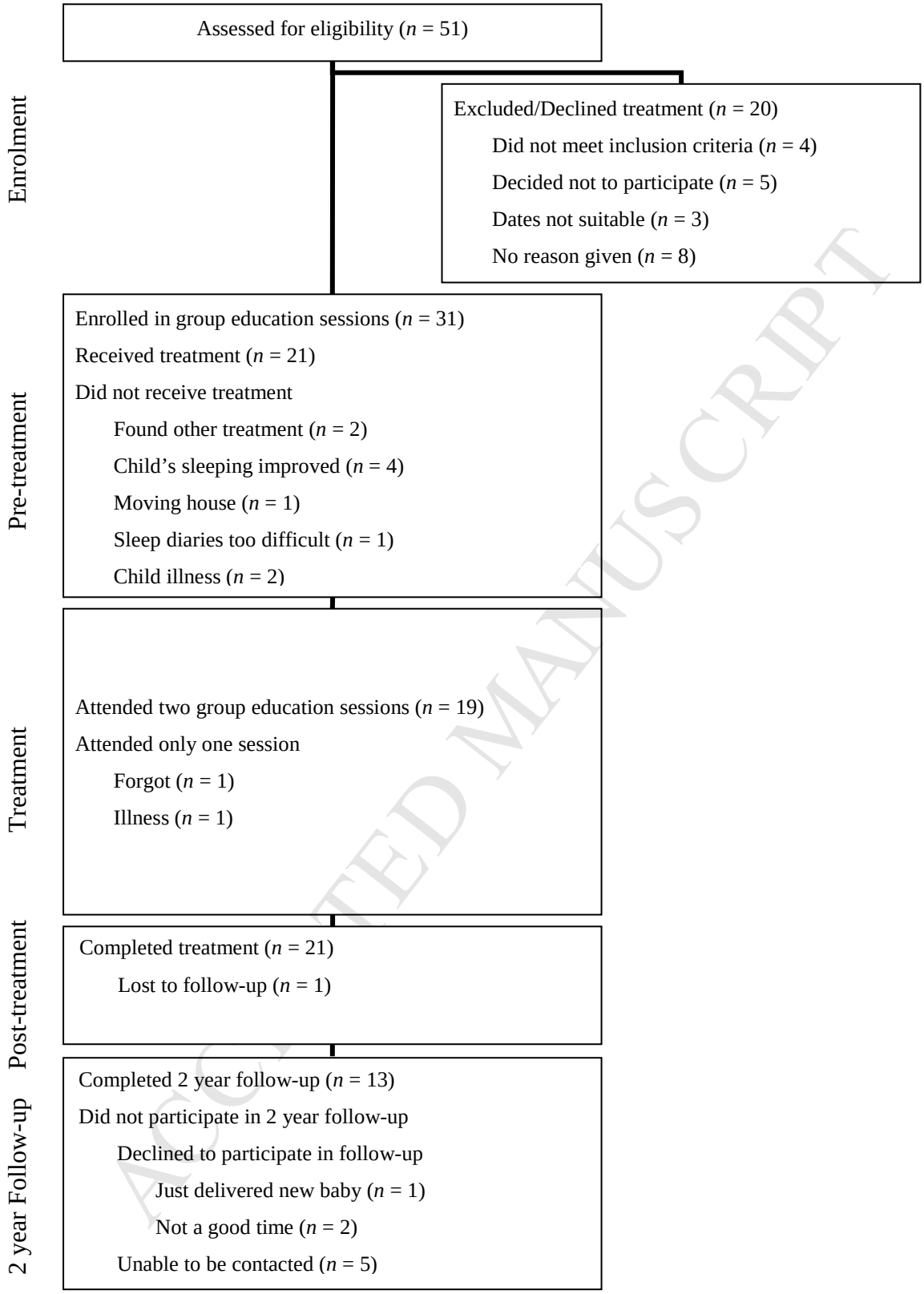

Figure 1. Participant flowchart showing the number of participants at each time point.

Table 1.

Demographic details of treatment completers.

	Number (percentage) of participants
Child's pre-treatment sleeping place	
Own bed	14 (66.7%)
Cot	2 (9.5%)
Parental bed	1 (4.8%)
Both in own bed and parental bed	4 (19%)
Siblings	
Only child	10 (47.6%)
One sibling	9 (42.9%)
Two siblings	1 (4.8%)
Three siblings	1 (4.8%)
Days of non-family child care	
0	2 (9.5%)
1	5 (23.8%)
2	8 (38.1%)
3	4 (19%)
5	2 (9.5%)
Mother marital status	
Married	19 (90.5%)
Defacto	1 (4.8%)
Single	1 (4.8%)
Mother education	
High school	2 (9.5%)
Trade Certificate	2 (9.5 %)
Diploma	5 (23.8%)
Undergraduate degree	6 (28.6%)
Postgraduate degree	5 (23.8%)
Annual household income	
$20,000 - $60,000	5 (23.8%)
$60,000 - $100,000	10 (47.6%)

Over $100,000	4 (19%)

Parent-report sleep diaries have shown reasonable reliability when compared with objective actigraph data, showing convergent validity of .88 for sleep onset recordings, .74 for total sleep time, and .60 for night time awakenings (Sadeh, 1996). This lower reliability of night wakings is not a concern in the present study as only child awakenings that disturbed parents were of interest. Night time awakenings to which the parents are not aware indicate that the child can self-soothe to re-initiate sleep.

Treatment predictor measures

Demographics. Demographic information was collected during the 2-week pre-treatment period. Items included parent and child sex and age, household income, maternal education, and family structure (e.g., number of family members).

Maternal affect. The 21-item version of the Depression Anxiety and Stress Scale ($DASS_{21}$; Lovibond & Lovibond, 1995) was used to investigate maternal depression, anxiety and stress levels as pre-treatment predictors for treatment outcome. The $DASS_{21}$ psychometric properties have shown to be equal if not better than the longer $DASS_{42}$ (Antony, Bieling, Cox, Enns & Swinson, 1998). In the present study the subscales showed reasonable internal consistency (α = .86 for depression, α = .78 for stress, and α = .75 for anxiety).

Family functioning. Family dysfunction has been associated with the occurrence of preschooler sleep problems (Gregory et al., 2005), and was investigated as a predictor of treatment outcome with the Confusion, Order and Hubbub Scale (CHAOS; Matheny, Wachs, Ludwig & Phillips, 2005). The 15-item CHAOS measured family functioning and was modified for the present study from a true/false response scale to a 5-point frequency scale (5="*always*", 4="*frequently*", 3="*sometimes*", 2="*rarely*", and 1="*never*") to provide greater sensitivity.

Treatment evaluation. The Education Satisfaction Questionnaire was developed to

measure participants' satisfaction and perception of usefulness with the group sessions, as well as the bedtime fading technique. The first section, the *Satisfaction scale*, included 11 items with a 5-point Likert-scale ranging from 0 "*strongly disagree"* to 4 "*strongly agree"*. This scale measured parent satisfaction with the group education sessions and the bedtime fading technique. The second section, the *Usefulness rating scale*, asked participants to rate how useful they found components of the education sessions (information on children's sleep need, sleep pressure and bedtime fading, the group format, and group discussions) from 1 (*not at all useful*), to 10 (*extremely useful*). It was included to assess which components of the group education sessions participants found most and least useful, as previous group treatment programs have found that parents have rated the group as the most useful component of treatment (Balfour, 1988; Szyndler & Bell, 1992). In addition, a follow-up questionnaire was designed for the current study to measure parent reflection on the bedtime fading treatment 2 years' post-treatment. This qualitative questionnaire explored parents' views on the bedtime fading treatment implemented and on their child's sleep during the two years since treatment.

Procedure

Participants were recruited through flyers distributed at childcare centres and advertisements in local parenting magazines in the Adelaide Metropolitan area. Interested parents were booked into treatment sessions and sent an information pack including letter of introduction, information sheet, and consent form. Prior to treatment, parents completed baseline and demographic measures and a sleep diary of their preschooler's sleep for 2 weeks.

Treatment involved two 90-minute group sessions that were 1 week apart. Groups consisted of 2 to 4 mothers. Group parent treatment can offer several benefits, including being time and cost efficient, as well as providing peer support not provided by individual

therapy. Previous studies that have conducted group parent treatments for children's sleep have primarily used extinction-based methods (Balfour, 1988; Carpenter, 1990; Wade et al., 2007). All sessions in the present were conducted by a 4th-year psychology student (MF), under the supervision of a clinical psychologist (MG) who had 5 years' experience in behavioural sleep medicine. Each parent paid AUD $40 to attend treatment.

The first group session consisted of two parts: sleep education and bedtime fading instruction. At the beginning of the first session, group norms were discussed and agreed upon so parents felt comfortable sharing their experiences and joining group discussions. The sleep education component purposefully linked knowledge of sleep to the principles underlying bedtime fading. This included information about the sleep architecture of normal, healthy pre-schoolers; the sleep needs of pre-schoolers (including age averages and normal range for night-time sleep needed; Adair & Bauchner, 1993; Iglowstein, et al., 2003), and the concept of sleep homeostatic pressure (Jenni & LeBourgeois, 2006). Theories behind bedtime fading (physiological sleep drive and learning theory; Piazza et al., 1997) were presented, and then the teaching of the bedtime fading technique occurred. Mothers worked through example scenarios before designing an individual treatment plan for their child with guidance from the group facilitator (MF).

The bedtime fading procedure was adapted from Piazza and Fisher (1991b). Parents began by developing realistic goals for their child's bedtime and wake-up time (e.g., 8:00pm and 7:00am). Using pre-treatment sleep diaries, parents calculated their child's average sleep onset time (e.g., 8:30pm). A new bedtime, 30 minutes later than the calculated average sleep onset time (e.g., 9:00pm), was used for the first 2 nights of treatment. Parents were instructed not to let their child fall asleep before the scheduled bedtime, but to keep their child awake and out of bed until their scheduled bedtime by playing quietly with their child or leaving them to play by themselves, but to be careful not to overstimulate them (e.g., to keep noise,

light and activity to a minimum). If the child fell asleep within 15 minutes after bedtime for 2 nights in a row, the scheduled bedtime was moved earlier by 15 minutes (e.g., 8:45pm). If, however the child took longer than 15 minutes to fall asleep, a new scheduled bedtime was created 15 minutes later (e.g., 9:15pm). The scheduled bedtime was not changed unless one of the above 2 criteria were met. Treatment was continued by scheduling bedtimes according to the above criteria until the goal bedtime was reached, or the scheduled bedtime moved back and forth 4 times consecutively (e.g., 8:15pm, 8:30pm, 8:15pm, 8:30pm). A flow chart detailing the bedtime fading procedure is shown in Figure 2. Parents were instructed to wake children at their goal wake-up time everyday (e.g., 7:00am), even if they thought their child had not had enough sleep. For children who had daytime naps, parents chose between ceasing daytime naps or containing them to a scheduled time (e.g., 12:30-2:00pm), with the instruction that naps needed to finish prior to 3pm.

If parents had no trouble with their child's ability to fall asleep, yet had difficulty with night waking, a slightly different method was used where they calculated their child's average nightly total sleep time (e.g., 10 hrs) from pre-treatment diaries. The child's time in bed was restricted to 30 minutes less than their average sleep time (e.g., 9 hrs 30 min). A new bedtime and wake-up time was set around this "time in bed" (e.g. 9:00pm and 6:30am). Participants were instructed not to let their child sleep outside of these scheduled times. The goal for awakenings was used as the "indicator" for whether to move the scheduled time in bed. If the child met their given indicator (e.g., less than 15 min awake in the night) for 2 nights in a row, the time in bed was increased by 15 minutes (e.g., 9 hrs and 45 minutes). If the child did not meet the indicator, their time in bed was decreased by 15 minutes (e.g. 9 hrs and 15 minutes). The scheduled time in bed was not changed unless one of the above two criteria were met. All participants received a handbook which they could refer to throughout the sessions and later at home. In addition, phone and email support were available during the

2-week treatment period; 7 participants contacted the facilitator during this time.

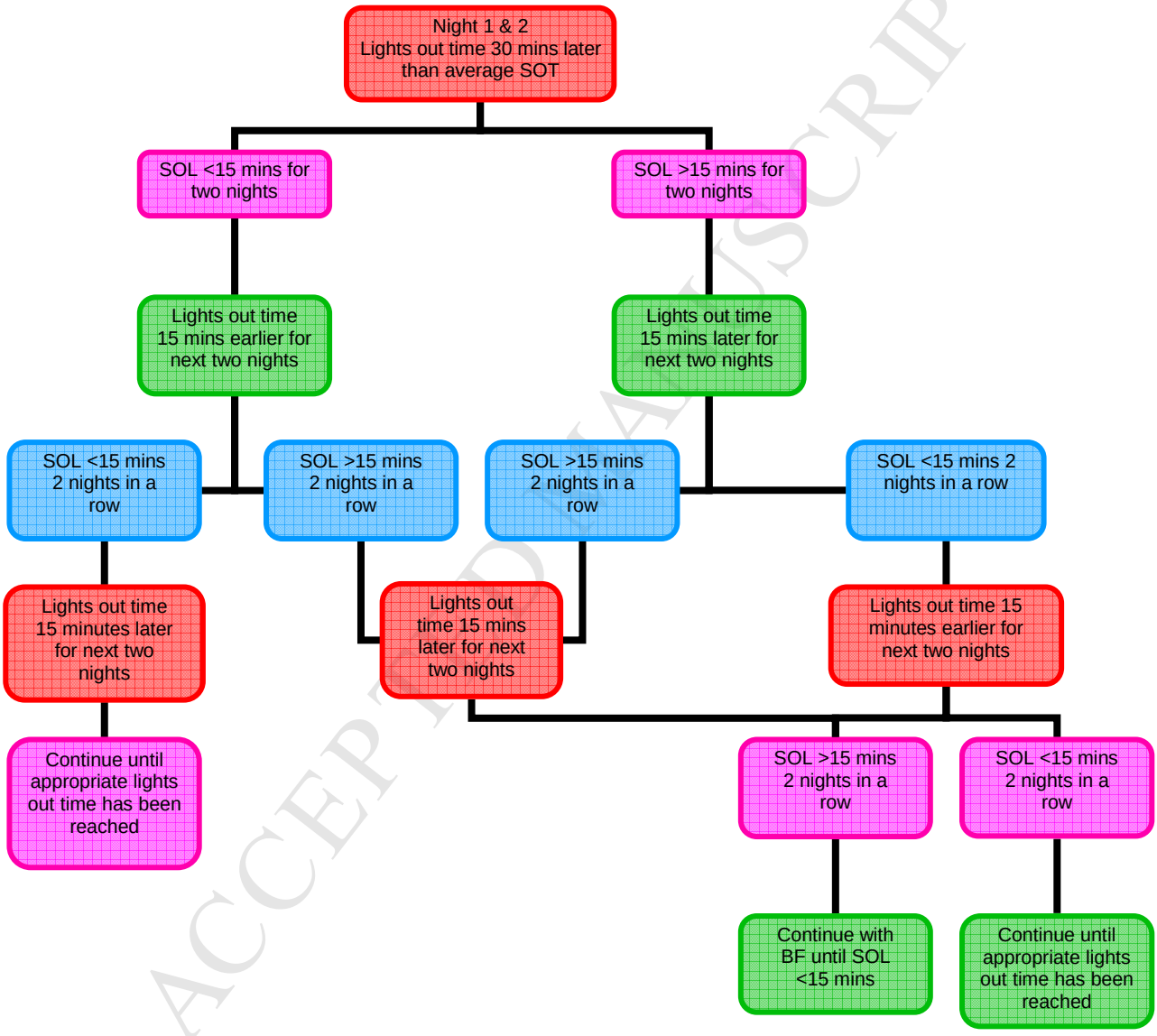

Figure 2. Flow chart detailing the bedtime fading procedure. SOT= Sleep onset time; SOL = Sleep onset latency, BF = Bedtime fading

The second group education session allowed parents to share their experiences of implementing bedtime fading with the group, support each other, and participate in group problem-solving. Discussions focused on ensuring children's and parents' daytime sleepiness was manageable, that partner's and siblings' routines were not overly disrupted, and perceptions of bedtime fading compared to other treatments previously used.

Sleep diaries were completed during treatment and continued for another 2 weeks' post-treatment. Parents evaluated the treatment and received an honorarium of AUD $20 upon the collection of sleep diaries and questionnaires. A high response rate was achieved for treatment and post-treatment data (N=21, 100%). Participants were contacted 2 years after treatment and asked to participate in a follow-up measurement which consisted of completing an additional 2 weeks of sleep diaries and a follow-up questionnaire. As the primary author implemented the group education program, an independent research assistant collected and scored all questionnaires and sleep diaries to reduce experimenter bias (Rosenthal, Persinger, Kline & Mulry, 1962). The research assistant was blind to the participant and period of data collection, except for the 2-year follow-up data.

Statistical Analyses

Although 21 out of 24 parents provided complete data before, during and after treatment, the drop-out rate at the 2-year follow-up was much higher, with only 13 of the 21 treatment-completers providing follow-up data. A series of independent-samples *t*-tests examined the differences between those who did and did not participate in the 2-year follow-up. Those who completed the 2-year follow-up were found to have significantly higher family dysfunction at pre-treatment (M = 46.8, SD = 10.9) than those that did not (M = 36.3, SD = 10.4; t (19) = -2.18, p = 0.04, indicating that families with more calm and predictable home environment during pre-treatment were less likely to participate at follow-up. Completers of the 2-year

follow-up also had significantly less pre-treatment WASO (*M* = 21.9min, *SD* = 18.7) than those who did not complete follow-up, (*M* = 49.6, *SD* = 19.5; *t* (19) = 3.25, *p* = 0.004). There were no significant differences on post-treatment sleep variables; however, there was a significant difference in participants' ratings of how much they "liked" the bedtime fading treatment at post-treatment. Those who did participate in the 2-year follow-up "liked" bedtime fading more (*M* = 3.23, *SD* = 1.0) than non-completers (*M* = 2.13, *SD* = 0.8; *t* (19) = -2.59, *p* = .02). Outcome variables at two-year follow-up were thus analysed on an intention-to-treat basis, with missing observations replaced using the last observation carried forward method. One-way repeated measures ANOVAs with post-hoc comparisons were used to assess the effect of treatment (baseline, treatment, post-treatment, 2-year follow-up) on sleep and tantrum outcomes. Within-subjects effect sizes (Cohen's *d*) were calculated, with values >0.20 representing a small effect, >0.50 representing a medium effect, and >0.80 representing a large effect. Treatment predictor variables were tested using bivariate correlations between maternal education, maternal depressed mood, anxiety and stress, and family disorganisation and change scores in SOL, WASO, and bedtime tantrums between pre-treatment and post-treatment.

RESULTS

Primary Outcome Measures

Descriptive statistics for sleep and bedtime tantrums at pre-treatment, treatment, post-treatment and 2-year follow-up are given in Table 2.

Sleep onset latency

One-way ANOVA results revealed a significant main effect of time on SOL, *F* (3,18) = 5.49, *p* < .011, Cohen's *d* = .99. SOL decreased significantly from pre-treatment to treatment, *t* (20) = 3.87, *p* = .001, Cohen's *d* = .91; but not between treatment and post-treatment, *t* (20) =

.85, p = .40, Cohen's d = .11, or between post-treatment and 2-year follow-up, t (20) = -.31, p = .76, Cohen's d = .04. Overall, results indicated that SOL rapidly decreased after treatment,

Table 1.

Means (standard deviations) for SOL, WASO, number of bedtime tantrums, at pre-treatment, treatment, post-treatment and 2-year follow-up.

	Pre-treatment (Pre)	Treatment (Tx)	*d* *(Pre - Tx)*	Post-treatment	2-year follow-up (Fu)	*d* *(Pre - Fu)*
SOL (min)	23.2 (11.3)	13.0 (7.3)	*0.91*	11.7 (8.1)	12.2 (7.2)	*0.99*
WASO (min)[a]	32.4 (23.1)	24.0 (18.3)	*0.41*	22.8 (17.6)	17.1 (18.7)	*0.70*
Awakenings (p/night)	1.7 (1.2)	1.6 (1.2)	*0.08*	1.4 (1.0)	1.1 (1.1)	*0.52*
Sleep Efficiency (%)	91.3 (4.3)	92.9 (3.8)	*0.40*	93.3 (3.7)	94.6 (3.8)	*0.82*
Total Sleep Time (hrs)	9.9 (0.9)	9.7 (0.8)	*-0.24*	10.1 (0.7)	10.2 (0.7)	*0.38*
Bedtime tantrums (p/wk)[a]	1.7 (3.0)	0.4 (0.7)	*0.43*	0.4 (0.9)	-	-

Note: [a]Raw data are reported for ease of interpretation; SOL = sleep onset latency; WASO = wake after sleep onset; *d* = Cohen's *d* effect sizes, where >0.80 = large, >0.50 = moderate, >0.20 = small; positive *d* values indicate improvements.

and this reduction was maintained to two-year follow-up. Pearson correlations between SOL and maternal depressed mood, anxiety, stress, family disorganising revealed that only pre-treatment maternal mood was significantly associated with changes in SOL. Specifically, mothers who reported more symptoms of depression at pre-treatment reported larger reductions in child SOL (r = .46, p = .04).

Wake after sleep onset

ANOVA results indicated a significant main effect of time on WASO, F (3, 60) = 7.95, p < .001, Cohen's d = .70, (see Table 1). Similar to SOL, a significant decrease in WASO was observed between pre-treatment and treatment, F (3,18) = 2.89, p = .01, Cohen's d = .41; but not from treatment to post-treatment, t (20) = 0.45, p = .66, Cohen's d = .04. A significant but small decrease was also found between post-treatment and the 2-year follow-up, t (20) = 2.25, p = .04, Cohen's d = .25. Thus, the results showed that WASO decreased during treatment, remained stable over post-treatment, and then further decreased at 2 years' post-treatment. No significant associations were found between change in WASO and pre-treatment variables.

Bedtime tantrums

Only 8 mothers provided data on bedtime tantrums across baseline, treatment and post-treatment periods. ANOVA results indicated a significant main effect of time on bedtime tantrums, F (2, 40) = 3.13, p = .04, Cohen's d = .43 (see Table 1). Bedtime tantrums significantly reduced from pre-treatment to both treatment and post-treatment. Spearman-ranked correlations showed no significant relationships between baseline variables and changes in bedtime tantrums.

Treatment Evaluation

Maternal perception of sleep problems. All 21 mothers categorised their child as having a sleeping difficulty at pre-treatment, compared to 13 out of 21 at post-treatment. A series of

independent samples *t*-tests were performed to explore the differences between sleep problem groups at post-treatment in terms of change scores, and post-treatment levels, of SOL, WASO and bedtime tantrums. None of the post-treatment or change sleep variables showed significant differences between the groups.

Table 3.

Mean (and standard deviation) ratings of Usefulness subscale items from the Education Satisfaction Questionnaire.

	M (*SD*)
Group format	7.89 (1.49)
Information about 'normal' sleep patterns	8.78 (1.06)
Information about sleep pressure	8.50 (1.15)
Information about bedtime fading	8.89 (1.32)
Group discussions	8.06 (1.63)

Note: Range 0-10, 0 = not useful at all, 10 = extremely useful.

Post-treatment Evaluation. The five Education Satisfaction Questionnaire "Usefulness" items were analysed to investigate the participant perception of the usefulness of the different components of treatment at post-treatment. All usefulness items were rated similarly highly, as shown in Table 3. No baseline family variables significantly correlated with usefulness ratings. Satisfaction with treatment was also rated highly (see Table 4), with a mean overall satisfaction rating of 3.36 out of 4 (*SD* = .55). No significant correlations were found between baseline family variables and satisfaction with treatment.

Table 4.

Mean (and standard deviation) ratings of Satisfaction subscale items from the Education Satisfaction Questionnaire.

	M (*SD*)
The sessions helped me understand my child's sleep patterns	3.43 (.75)
The sessions increased my knowledge about children's sleep	3.48 (.60)
I noticed improvements in my child's sleep as a result of sessions	3.00 (.95)
I was easily able to communicate information to my partner	3.15 (.75)
The sessions were well organised	3.52 (.51)
The sessions were presented in a professional manner	3.52 (.70)
Overall, I enjoyed the sessions	3.67 (.48)
Overall, I found the sessions useful	3.52 (.48)
I would recommend the group education sessions to others	3.52 (.48)
The bedtime fading technique was easy to understand	3.33 (.58)
I like the bedtime fading technique	2.81 (1.08)

Note: Range 0-4, 0 = strongly disagree, 4 = strongly agree.

Follow-up Evaluation. All participants who completed the 2-year follow-up data responded that they would recommend the treatment program to others, and they found the treatment helpful in understanding their children's sleep and assisting their child in sleeping better. All but one participant said that they would take part in a similar program in the future if sleep problems re-emerged. Out of 13 participant respondents, 10 indicated that the treatment helped their child get to sleep more easily, and 8 reported that the treatment reduced night awakenings. Just over half of respondents (N = 7) had used the bedtime fading procedure learned during the treatment sessions again and reported that using the procedure was successful in improving their children's sleep at that time. Several participants (N = 8)

reported that they had shared the techniques learned with other parents. Only one participant had sought alternative treatment for their infant's sleep with another professional (Occupational Therapist) in the 2 years' post-treatment, and reported that this treatment provided benefits. One participant reported that their child had developed a new sleep problem during the 2-year follow-up period.

DISCUSSION

The Effect of Bedtime Fading on Sleep and Bedtime Tantrums

The current study evaluated the effectiveness of bedtime fading to improve sleep onset latency, wake after sleep onset and bedtime tantrums in typically-developing pre-schoolers. Consistent with the results of previous studies among atypically developing children and typically developing infants, the present study showed that bedtime fading led to rapid and significant decreases in SOL, WASO and bedtime tantrums (Ashbaugh & Peck, 1998; Gradisar et al., 2016; Piazza & Fisher, 1991a, 1991b; Piazza, Fisher & Moser, 1991; Piazza, Fisher & Sherer, 1997). The present study also extended on these findings by including a larger sample and including a 2-year follow-up, which indicated that the treatment gains were maintained after 2 years.

Improvements on SOL were greater than those for WASO and bedtime tantrums, suggesting that bedtime fading may be most useful in treating pre-sleep "settling problems". The bedtime fading procedure targets SOL directly by moving the sleep attempt to a later time when rapid sleep onset is more likely, due to heightened homeostatic sleep pressure. The principles of classical conditioning may also contribute to these treatment effects. As children experience consecutive nights pairing going to bed with high levels of sleepiness and rapid sleep onset, they are given multiple opportunities to develop an association between bed and rapid sleep onset.

Bedtime fading does not directly target WASO in this same way, however, the shorter sleep opportunities and heightened homoeostatic sleep pressure at the beginning of the treatment period may help to reduce wakefulness after sleep onset. Previous bedtime fading studies have found more substantial reductions in WASO, with some claiming that WASO was eliminated as a result of treatment (Piazza & Fisher, 1991a; Piazza et al., 1997). However, salient differences in both study populations and treatment protocols may account for these differences. These include the focus on atypically developing children, treatment implementation in an inpatient setting, inclusion of response cost, and concurrent treatment for severe behavioural problems.

The present study extends the current literature by investigating the effect of bedtime fading on tantrums. Results indicate a significant decrease in bedtime tantrums. This supports Piazza and Fisher's (1991b) suggestion that bedtime fading could lead to reductions in parent-child "power struggles" (p. 56) as children are put to bed at a time that is closer to a biologically permissive sleep onset time. Extant research has shown that parents often overestimate the amount of sleep children need and put children to bed for longer than they need (Iglowstein, et al., 2003; Sadeh, 2005). The present findings suggest that pre-treatment bedtime tantrums may partly result from children resisting going to bed when they were put to bed too early, before adequate subjective sleepiness and homeostatic sleep pressure is built, however, some caution must be taken when interpreting these findings due to the small number of parents who provided data on bedtime tantrums.

Although the AASM practice parameters rate preventive parent education as effective as a stand-alone therapy for the treatment of bedtime problems and night waking in infants and young children (Morgenthaler et al., 2006), our sleep education component consisted of explaining young children's sleep need and sleep homeostatic pressure – the latter as a treatment rationale to explain to parents why we were going to encourage them to set a later

bedtime. This unique type of sleep education in of itself is unlikely to influence young children's sleep, whereas the bedtime fading technique, which changes children's behaviour, would be more potent. We can only speculate this as we did not compare sleep education alone vs sleep education + bedtime fading, which future studies could compare.

An additional strength of the present study is the inclusion of a 2-year follow-up. Although the number of drop-outs at follow-up was high, results of this follow-up showed that the gains made during treatment were maintained, suggesting that bedtime fading may produce long-term benefits for children's sleep.

Predictors of Treatment Response

The present study also extends present literature by examining factors that predict treatment outcome for bedtime fading. Neither maternal education, family disorganisation, or maternal anxiety or stress predicted treatment response. Maternal depression predicted post-treatment change in SOL. As depressed mood increased, reductions in SOL also increased. This finding runs counter to those found in other studies, which commonly find a negative association between maternal depressed mood and treatment response (Reid et al., 1999). Supplementary analysis found that the significant relationship between maternal depressed mood and change in SOL were no longer related after controlling for SOL severity. Past research has shown a relationship between maternal depression and children's sleep problem severity (Warren et al., 2006). In addition, it is those children with longer SOLs who have the potential for the largest post-treatment reductions in SOL. Therefore, the relationship between maternal depression and change in SOL is likely a spurious relationship, influenced by SOL severity.

The sample characteristics of the present study may have contributed to the lack of significant results for predictors of treatment outcome. The present sample was relatively homogenous, with the majority of mothers aged in their 30's, high functioning, well-

educated, and in stable relationships. Maternal depression, stress and anxiety levels were very low across the sample, with very few participants meeting criteria for even mild severity. This homogeneity may be due to the recruitment methods used, because parents were required to proactively contact the program facilitator (MF) and pay a small treatment charge. Future research could implement treatment through large child public health organisations to reach a larger, more diverse population.

Parent Evaluation of Treatment

Results of the present study suggest that bedtime fading is amenable to the group format, which may be a more efficient means to offer treatment to multiple families. Unlike previous studies, which found aspects of the group the most beneficial component of a treatment, mothers in the present study rated the educational components as more useful than the group format. This indicates that individual treatment could also be efficacious to implement this therapy. With short instruction on the bedtime fading procedure, parents were able to develop individual treatment plans. Parents reported that they were able to implement bedtime fading successfully in the home environment. Post-treatment evaluation by the parents illustrated that parents found both the sleep education and bedtime fading components of treatment useful. A number of parents reported that they had successfully implemented bedtime fading again within the 2-year follow-up period, indicating that the treatment gave parents knowledge of theory, techniques and procedures that could be used again as required. This is an important benefit of behaviour therapy, as it gives people knowledge and skills, not only to treat problems at the time of treatment, but also to prevent and manage relapse.

Overall, mothers were satisfied with the treatment and found it useful. However, it is interesting to note that the item, “I like the bedtime fading technique”, was less favourably endorsed that the other items. Aspects of bedtime fading may be perceived as being difficult

or unpleasant to implement. In particular, keeping preschool children up later at night may seem counterintuitive to parents.

Study Limitations and Future Research Directions

The present study has several strengths, including being the largest study to evaluate bedtime fading and adding to the sparse literature on the efficacy of bedtime fading for typically developing children. There are, however, important limitations that must be considered when interpreting current findings. The absence of a control condition is a major limitation. As such, there are additional variables that may have contributed to these findings. Firstly, the act of monitoring children's sleep through sleep diaries may result in changes to how parents view their children's sleep or to make changes to their bedtime routine. In addition, demand effects and social desirability responding may have meant that mothers report their child's sleep more favourable subsequent to treatment. The lack of control condition is particularly problematic when interpreting the findings at the 2-year follow-up. As such, it cannot be determined that the maintenance of treatment gains was due to therapy or rather to normative developmental changes in the children's sleep over time. Although sleep problems in children are often long-standing problems (Kataria, et al., 1987), a control condition would be able to clearly demonstrate the benefit of bedtime fading over normal maturation. The issue of maturation is less salient for pre-treatment, treatment and post-treatment results as these measurements were taken within a period in which significant maturational changes are unlikely to occur. Future research would profit from focussing efforts on randomised control trials to explore the relative effectiveness of bedtime fading compared to a control condition as well as other evidence-based treatments, such as extinction methods.

There are also limitations regarding the generalizability of these study findings. This study focused upon healthy, typically developing preschool-aged children. Further studies are

needed to extend this work to include older children, and children with health conditions or atypical developmental. In addition, this sample were exclusively mothers who were mostly of a high socioeconomic status, so including more diverse samples of parents and caregivers, as well as different socioeconomic backgrounds would benefit future research.

Finally, this study would have benefitted from the inclusion of a compliance measure. This would be beneficial to measure the degree to which parents could implement treatment and whether compliance impacted treatment outcomes. In addition, the having an objective measure of children's sleep would help to minimise responder biases and determine whether objective sleep parameters similarly change.

While only one child in the present study exclusively co-slept, there is much variability within and between cultures regarding co-sleeping (McKenna et al., 1993). Future research would profit by gathering information on co-sleeping before and after therapy to determine whether this changed across the course of therapy and to examine whether treatment effects varied according to the child's sleeping location.

Conclusions

The present study adds to the limited literature examining the efficacy of bedtime fading to help the sleep problems and bedtime tantrums of preschool-aged children. Bedtime fading was helpful as a single component treatment to reduce SOL, WASO and bedtime tantrums, thus supporting the efficacy of bedtime fading without concurrent response cost. Given the relative stability of sleep problems across this developmental stage, providing a quick treatment that is easy to implement - and re-implement - offers promise to parents and clinicians alike.

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HIGHLIGHTS

- Bedtime fading was delivered to parents of children aged 1-4 years
- Bedtime fading reduced sleep onset latency and wake after sleep onset
- Bedtime tantrums were reduced following treatment
- Treatment gains were maintained at 2-year follow-up