An Evaluation of a More-Adaptive Treatment of Elopement Using Modern Technology for Children With Developmental Disabilities

Ehren J. Werntz

A Dissertation Submitted to the Faculty of

The Chicago School of Professional Psychology

In Partial Fulfillment of the Requirements

For the Degree of Doctor of Philosophy in Applied Behavior Analysis

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2019

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Abstract

Elopement is an extremely dangerous behavior that can and does lead to serious harm and death. Moreover, elopement has a high incidence among individuals with developmental disabilities. Although previous research has demonstrated effective interventions to reduce elopement in individuals with developmental disabilities, the strategies have been effortful, inappropriate for some settings, and inaccessible to caregivers with mobility challenges. The present research advances the body of empirically supported treatments for elopement among individuals with developmental disabilities by integrating remote signaling devices with operant training procedures. The results of this research support the use of modern technology as a way to treat elopement in a way that allows for greater ranges of distance from caregivers than previously published treatments and provides an option for caregivers physically incapable of administering other protocols. The present research also includes data on treatment acceptability and parental self-efficacy that supports the social validity of this procedure.

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Chapter 1: Nature of the Study

Background

Elopement has been defined as a person leaving designated areas without supervision or permission and exceeding an established distance from a caregiver (Boyle & Adamson, 2017; Piazza et al., 1997). Elopement is a primary concern for many parents of children diagnosed with *autism spectrum disorders* (ASD; Anderson et al., 2012; Kiely, Migdal, Vettam, & Adesman, 2016). According to Anderson et al. (2012), 49% of individuals with an ASD diagnosis attempted to elope at least once after the age of four. Elopement among families affected by ASD is a significant concern because it can and does lead to individuals going missing or wandering into dangerous situations such as traffic or bodies of water (Rice et al., 2016). Approximately two thirds of elopement reports involved an individual with ASD being in immediate danger of a traffic injury, and one fourth were in danger of drowning (Anderson et al., 2012; Rice et al., 2016). Incidentally, drowning is among the leading causes of unnatural deaths for this population (Guan & Li, 2017; Mouridsen, Brønnum-Hansen, Rich, & Isager, 2008; Shavelle, Strauss, & Pickett, 2001). The presence of elopement increases the risk of these tragic outcomes and contributes to the ASD mortality statistics that are already double those of the general population (Anderson et al., 2012; Lehardy, Lerman, Evans, O'Connor, & LeSage, 2013; Shavelle et al., 2001). Furthermore, when Anderson et al. (2012) surveyed 1,367 families, they found that roughly half of respondents reported that their child's elopement prevented them from sleeping through the night and enjoying activities outside the home and it increased stress that they already had trying to cope with their child with ASD. Additionally, half reported that they had no guidance on how to prevent or address their child's elopement behavior.

Despite the significance and prevalence of this behavior among individuals affected by ASD, there has been proportionally little behavioral research conducted in this area (Anderson et al., 2012; Jessel et al., 2018; Kiely et al., 2016; Lehardy et al., 2013; Traub & Vollmer, 2019). There have been two systematic reviews of the treatment of elopement in the behavioral literature (Boyle & Adamson, 2017; Lang et al., 2009). According to these reviews, between 1945 and 2015 (50 years) there were only 20 behavioral studies published, and only 15 of which were experimental. In Lang et al.'s review, they found that 60% included only one participant (Lang et al., 2009; Traub & Vollmer, 2019). Since Boyle and Adamson's (2017) publication, there have two more additions to the behavior analytic, elopement in developmental disabilities research (Jessel et al., 2018; Traub & Vollmer, 2019), the most recent (Traub & Vollmer, 2019) having focused exclusively on assessment rather than intervention.

Of the available behavior-analytic research into the treatment of elopement, a number of elements could potentially contribute to risks to external validity. One concern is that 80% of elopement research has been conducted in contrived, tightly controlled settings (Lang et al., 2009) despite that most families report elopement occurring in public settings (Anderson et al., 2012; Kiely et al., 2016). When parents of children with ASD surveyed, N = 3,518 by Kiely et al. (2016) and N = 1,367 by Anderson et al. (2012), reported that the single most common places where elopement occurred were public settings such as stores, restaurants, and playgrounds; yet much of the ASD/developmental disability (DD) research on elopement has been conducted in classrooms, institutional facilities, and outpatient clinics, (e.g., Call, Pabico, Findley, & Valentino, 2011; Davis et al., 2013; Falcomata et al., 2010; Gardner, 1991; Jessel et al., 2018; Lehardy et al., 2013; Piazza et al., 1997; Traub & Vollmer, 2019). Furthermore, among the limited body of research in which elopement intervention has been evaluated in community

settings (Stevenson, Ghezzi, & Valenton, 2016; Tarbox, Wallace, & Williams, 2003), the individuals mediating reinforcement contingencies were experimenters and tutors rather than those who would typically mediate contingencies in natural settings, specifically the parents and guardians of the eloping individual (Anderson et al., 2012). Stokes and Baer (1977) encouraged behavior analysts to "teach subjects to cue their natural communities to reinforce their desirable behaviors" and to "use stimuli likely to be found in generalization settings in training settings" (p. 364) in the service of developing a repertoire likely to transfer outside of experimental sessions. The present study was designed in response to these notions. All experimental sessions were conducted in community settings identified as common locations of elopement. Additionally, during all sessions the parent–guardian was the one establishing elopement criteria, signaling return responses and mediating reinforcement.

Another potential issue with interventions evaluated in the applied behavior analysis (ABA) literature is the restrictiveness of the procedures and their accessibility to all populations. The elopement research conducted in community settings (Stevenson, Ghezzi, & Valenton, 2016; Tarbox et al., 2003) required as part of the procedures that participants remain between 1 and 1.5 m from caregivers at all times. During the present research, such requirements would have been contextually inappropriate for some settings such as parks and playgrounds. In addition, this requirement would have been impossible for one guardian participating in this study, who as the result of a stroke was paralyzed on one half of her body and required the use of a walker to get around. It could be assumed that a 1- to 1.5-m requirement would be impossible for many parents–guardians who have mobility limitations and children who elope.

Additionally, social validity is an important metric that should be included in behavioral research (Kelley, Heffer, Gresham, & Elliott, 1989; Wolf, 1978); however, with respect to

elopement research, it is largely missing. Among all published elopement research for ASD and DD populations, Jessel et al. (2018) is the only article in which social validity data was published. Kelley et al. (1989) stated that "assessing clients' acceptability of treatment procedures" (p. 236) is one method of measuring social validity. Kelley et al. made further three distinct arguments for the collection of such data. First, as ethical researchers and practitioners, we are obligated to ensure that interventions are perceived as humane and appropriate in a societal context. Second, it is unlikely that consumers will engage in a treatment that is unacceptable, which would be inconsistent with the tenets of ABA (Baer, Wolf, & Risley, 1968). Third, whenever there are options for consumers to select different treatments for a given concern, as it the case with elopement, client preference is a relevant variable that should be available for consideration. For this reason, postintervention data were collected using the Treatment Evaluation Inventory–Short Form (TEISF; Kelley et al., 1989).

In addition to social validity, data on self-efficacy were collected before intervention and between 2 weeks and one-month posttreatment for each participant's parent–guardian. Bandura (1977) defined self-efficacy as "the conviction that one can successfully execute the behavior required to produce the outcomes" (p. 193). Biglan (1987) offered an alternative conceptually systematic account of self-efficacy stating that "ratings, statements, and thoughts of self-efficacy may be seen as verbal behavior in which people predict other behavior" (p. 5). As such, self-efficacy statements can function as discriminative stimuli or consequences for effortful behavior (Biglan, 1987). Other research has described correlations between high parental self-efficacy and improvements in children's behavior problems with and without the presence of ASD (Hastings & Brown, 2002; Heller, 1993). Data showing changes in self-efficacy perceptions are presented in Chapter 4 (the results) of this paper.

Elopement is a concern of tremendous social significance that affects almost every family affected by ASD (Anderson et al., 2012) and "is a uniquely dangerous behavior in that the individual is, by definition out of reach or out of sight of caregivers" (Boyle & Adamson, 2017, p. 375). The present research was completed with the goal of contributing to the limited body of behavior-analytic literature for individuals with ASD and other DDs and expanding on available, empirically supported approaches to treating this highly prevalent and extremely dangerous concern. This study evaluated an operant training procedure in which 2 children with ASD and one with ADHD and oppositional defiance disorder, all with a history of elopement in public settings, were trained to respond to a remote signaling device attached to their clothes by returning to their parent–guardians in lieu of eloping in high-probability conditions. This study included treatment acceptability data, self-efficacy data, and produced data to support a procedure that allowed both greater flexibility to engage with their environment as appropriate as well as an intervention option that was effective for parents–guardians with mobility limitations.

Chapter 2: Review of the Literature

Recent research provides a strong case that elopement is a socially significant target for treatment and continued research (Anderson et al., 2012; Kiely et al., 2016). In a large-scale research project, Anderson et al. (2012) surveyed the families of 1,218 children diagnosed with an ASD and 1,076 typically developing siblings, and they provided findings related to an overall estimate of the prevalence of elopement in children with ASD and the impact it has on their families. The researchers were primarily concerned with prevalence of elopement starting at 4 years of age, at which point elopement and wandering becomes less and less common among typically developing children. Almost half (49%) of respondents reported that their child with ASD had attempted to elope at least once after the age of 4 years, this was four times as prevalent as the reports for typically developing siblings. Among those respondents, 53% reported that their child had gone missing long enough to cause concern (average = 41.5 min), 65% had "close calls" with traffic, and 24% came close to drowning; all potentially life-threatening situations. The majority (56%) of respondents reported that elopement was one of the most stressful behaviors that they had to manage (Anderson et al., 2012). Many parents (43%) reported that the probability of elopement prevented them from getting adequate sleep, and over half (62%) reported that it prevented them from attending events or enjoying activity outside of the home. In addition to the frequency and severity of this behavior or the stress and impact on the family, half (50%) of families reported that they had not received any help or guidance on how to prevent or treat this extremely prevalent and high-risk behavior. All of these issues affect the quality of life for the entire family.

Kiely et al. (2016) also surveyed the parents of 4,032 children with a developmental disability, 3,518 of whom were diagnosed with an ASD. These researchers were primarily

investigating variables that correlated with rates of elopement. These researchers found that among their sample, 26.7% of all respondents reported that their child with ASD had attempted to elope within the past 12 months and that individuals diagnosed with ASD were significantly more likely to elope compared to individuals diagnosed with an intellectual disability (ID) alone. Also, young children between the ages of 6 and 11 were more likely to elope than older children between the ages of 12 and 17. Additionally, public settings were reported as the most-common type of setting in which elopement occurred. In fact, if the child had a diagnosis of ASD (with or without a comorbidity of ID) elopement in a public setting was more than twice as common (23.8%) that elopement from home (10%) or a structured program (10.3%). The most commonly used preventative measure for elopement was physical barriers such as gates (28.15%). Although this is a highly pragmatic measure to take, physical barriers do nothing to prevent elopement from public settings and are not always practical or possible solutions for homes or school–clinic settings. The second most commonly adopted elopement-prevention measure is using electronic devices such as wearable GPS tracking devices (3.1%). These devices were not used as a signaling device, rather they were simply tracking devices worn by the children, so the parents or teachers were able to locate them at all times. This is an excellent example of a modern technology being used effectively within a behavioral treatment package.

In the past 10 years, there have been three reviews of behavioral treatments for elopement for ASD and developmental disabilities published in peer-reviewed journals. The earliest publication was that of Lang et al. (2009). Lang et al. conducted a systematic review of three electronic databases, Education Resources Information Center (ERIC), Psychology and Behavioral Sciences Collection, and PsycINFO and included articles if they described an intervention for elopement for at least one person with a developmental disability. They

summarized studies based on five categories: participants, assessment procedures, intervention procedures, findings, and certainty of evidence. Ten studies were included in their review, which included interventions for 53 participants. Participants ranged from age 3 to 47 years, each with a clinical or developmental diagnosis, including Asperger's syndrome, ASD, seizure disorder, dementia, intellectual disability, Down syndrome, attention-deficit/hyperactivity disorder (ADHD), or emotional disorder. Among the participants, 70% were male and 30% were female, and the most common disability (88%) was an intellectual disability. Among the studies reviewed, sample sizes ranged from one to 39, and the majority (9/10) of the studies were single subject designs with sample sizes ranging from one to three. The outlier in this group was Thorne's (1947) nonexperimental study, which included 39 participants. Additionally, 50% of the interventions were conducted in institutional or residential settings, 20% in vocational settings, 10% in group homes, 10% classrooms, and 10% in outpatient clinics. The majority (80%) of studies included some discussion of function; more specifically, 20% offered a functional hypothesis without assessment (e.g., Bowman, 1996; Rapp, Vollmer, & Hovanetz, 2005), and 60% included indirect interview of providers (e.g., Garner, 1990; Thorne, 1947), direct observation (e.g., Padgett, Garcia, & Pernice, 1984), and functional analysis (e.g., Piazza et al., 1997; Tarbox et al., 2003). Lang et al. (2009) found that 80% of the studies reported positive outcomes, meaning that the participants showed improvement due to intervention or "improvement was noted for all participants within the study" (p. 678; e.g., Garner, 1990; Olmi, Sevier, & Nastasi, 1997, Padgett et al., 1984; Perrin, Perrin, Hill, & DiNovi, 2008; Piazza et al., 1997; Rapp et al., 2005; Tarbox et al., 2003; Whitaker & Saleem, 1994); 20% were mixed, meaning improvements were not noted across all participants or behaviors targeted (e.g., Bowman, 1996; Thorne, 1947); and none reported negative outcomes. It is important to note that

half of the studies did not use experimental designs (Bowman, 1996; Garner, 1990; Olmi et al., 1997; Thorne, 1947; Whitaker & Saleem, 1994) and as such the results were categorized as inconclusive. Lang et al. (2009) supported the generalized use of operant technologies to reduce elopement in individuals with cognitive, neurological, behavioral, and developmental disabilities. They also highlighted the need for treatment in generalized settings and a greater body of empirical support for these interventions.

Call, Alvarez, Simmons, Mevers, and Scheithauer (2017) addressed two concerns associated with elopement treatment with individuals' developmental disabilities: external validity and publication bias. Publication bias refers to publication practices in which data showing a significant treatment effect are published and data from similar experiments, which do not show treatment effect, are not (Sham & Smith, 2014). Presenting incomplete, or biased, data sets is concerning when evaluating the evidence base of a treatment package. Call et al. (2017) dealt with this by reviewing unpublished clinical outcomes from a patient-record database of an intensive outpatient treatment clinic in which both successful and unsuccessful outcomes were recorded. They reviewed the medical records of 1,458 participants, but only 11 met inclusion criteria. Call et al. (2017) found that the most-common interventions implemented were differential reinforcement of other behavior (DRO; 64%), differential reinforcement of alternate behavior (DRA; 45%), and a combination of DRO and DRA (17%). Other intervention components, such as blocking, token economies, and response cost, were used in 36% of cases in combination with DRA or DRO. The outcome data included an overall reduction of elopement behavior by 86.91% between baseline and intervention phases, and a statistical analysis included an overall effect size of $d = 1.18$, which exceeds the standard for a large effect size of 0.8 (Gravetter & Wallnau, 2016). These data are important because they are gathered from an

unbiased set, which was large enough to conduct a statistical analysis and showed a significant effect. However, one limitation stated by the authors was that all interventions were conducted within a day-treatment setting. There is still a substantial need to analyze interventions within natural settings and with caregivers to increase the generalizability and external validity of current elopement treatment research.

Boyle and Adamson (2017) completed another systematic review on elopement research published between 2000 and 2015, but they were primarily concerned with trends in functional analysis and treatment of elopement in addition to the efficacy of interventions evaluated. They included articles, which were published between 2000 and 2015, with participants diagnosed with a developmental disability and with demonstrations of an experimental procedure and functional relationship. They found 12 articles which met the inclusion criteria. Boyle and Adamson extracted data from each article and measured effect sizes using a statistical calculation known as the standardized mean difference (SMD). In their review, three data points were taken from each phase of each intervention, and SMD was calculated by taking the mean frequency, latency, or duration (depending on the measurement system of each study) of elopement during intervention phases, subtracting it from the mean frequency, latency, or duration from baseline phases, and then dividing the difference by the standard deviation of all phases. The FA variations used most often were latency FAs (5), reversals FAs (2), brief FA (1), and pairwise FA (1). The aggregated FA results were that 45% of participants' elopement was maintained by multiple functions. The functions, in order from most to least common, were escape (90%), attention (85%), tangible (70%), and automatic (20%). Functional communication training (FCT) was the most commonly used intervention (e.g., Call et al., 2011; Davis et al., 2013; Falcomata et al., 2010; Gibson, Pennington, Stenhoff, & Hopper, 2010; Kodak, Grow, & Northup, 2004;

Lang et al., 2010; Lehardy et al., 2013; Perrin et al., 2008; Stevenson et al., 2016; Tarbox et al., 2003); however, it was always paired with a supplemental intervention such as response blocking, extinction, or response cost. Noncontingent reinforcement (NCR) was the second-most commonly used intervention (combined with time out, blocking, or extinction; Kodak et al., 2004; Lang et al., 2010; Perrin et al., 2008; Tarbox et al., 2003) and differential reinforcement of other behavior (DRO), with and without blocking, was used in one study (e.g., Call et al. 2011). Among the reviewed studies, all but one (Call et al., 2011) reported significant clinical outcomes. Results transformed into SMD statistics were sorted into three categories: small effect ($d > 0.2 > 0.5$), medium effect ($d > 0.5 > 0.8$), and large effect ($d > 0.8$). Nine interventions produced a small effect, five produced a medium effect, and one had a large effect. Boyle and Adamson (2017) provided readers with a valuable overview of the evidence-based interventions for elopement in developmental disabilities. Additionally, one is also empowered, based on the results, to select from the most clinically and statistically effective interventions available. One might infer from these results that although effective interventions exist in the literature, there is still a need for more options that might be adaptive across settings as well as published data on interventions in the natural setting.

Garner (1990) first evaluated a graduated-levels intervention to treat wandering of a 19-year-old resident of a group home. Although the design is not particularly strong, the study is important as it is the first to evaluate an elopement intervention in the DD population. All prior research had primarily dealt with running away associated with juvenile delinquency (e.g., Adams & Munro, 1979; Morgan, 1982). Garner (1990) successively increased the perimeters within which the participant had to stay in order to avoid punishing consequences (i.e., time out) and contact reinforcing consequences (i.e., verbal praise). The levels system arranged by the

experimenter consisted of four levels. At Level 1, scheduled outings were planned for twice per day, and additional requests to go outside were reinforced by staff. During outings, *stop training* consisted of reinforcing stopping following the instruction "stop." Failure to stop resulted in a time out in the participant's bedroom. After 30 consecutive days without elopement, the participant graduated to Level 2. At Level 2, the procedures remained the same except the participant's range of freedom was doubled. After 14 days without elopement, the participant graduated to Level 3. At Level 3, again the general procedures remained the same, and freedom to access areas in the building was increased by 50%. Seven days without elopement at Level 3 was reinforced with graduation to Level 4, at which point restricted areas were eliminated. Stop training was conducted on average 6.5 times per day, and time outs were used three times daily on average. The intervention took 18 months, and in that time, elopement decreased by 95.4% from baseline. Although one may suppose a functional relation, the AB design used does not demonstrate a strong relationship. Additionally, it might also be argued that a more-efficient and less-restrictive intervention might have been used if reinforcers selected were informed by a preference assessment or functional analysis.

Piazza et al. (1997) evaluated a function-based intervention derived from the results of experimental functional analyses. Additionally, they evaluated their intervention using a robust reversal design that was replicated across participants. This research stands as an important marker in the elopement and developmental disabilities because of the application of such strong research methodology. This study had three separate experimental procedures: the functional analysis, the reinforcer assessment, and the treatment evaluation. All 3 participants were included in the study because they had been referred for a history of eloping from safe places and caregivers and therefore requires constant supervision. Elopement was defined as either passing

through the doorway of a clinic room and/or moving or attempting to move 3 m or more from the experimenter. A multielement design was used to experimentally evaluate function, and a reversal design was used to evaluate the intervention.

The results of the FAs were somewhat different across participants (Piazza et al., 1997). The data from the first participant showed high rates of elopement in the access to tangibles condition. The data from the second participant showed results of high rates of elopement in the access and contingent attention condition. The data from the third participant showed results that were undifferentiated across conditions. Because the results were unclear for the third functional analysis, subsequent reinforcer assessments were conducted. The reinforcer assessment evaluated the effects of different consequences (e.g., attention, access to tangibles, and access to running) compared with a control (e.g., no programmed consequences) on the behavior of card selection using a concurrent operants design. The reinforcer assessment provided researchers with data to indicate that access to tangibles for the second participant and attention from adults for the third participant both had reinforcing effects. The researchers used the data from the functional analyses as well as the reinforcer assessment to develop a DRO for the first participant, an NCR intervention for the second, and a DRA for the third. Each intervention resulted in near-zero levels of elopement behavior in the experimental setting. Although there was some variability in results in generalized settings, levels of elopement remained significantly lower than baseline for each participant.

Piazza et al. (1997) made an important contribution to the behavior-analytic research concerning elopement and developmental disabilities. This study provided evidence that elopement by children with developmental disabilities could be brought under experimental control, function could be determined, and when FA results were undifferentiated, reinforcers

could be identified using a concurrent-operants procedure. Most important to note, this research demonstrated that effective, conceptually systematic interventions can be developed to treat the socially significant concern of elopement. Although the importance of Piazza et al. (1997) should not to be understated, two limitations of that study included that the analyses were conducted in artificial settings, and the primary interventionists were not those with whom elopement naturally occurred. Tarbox et al. (2003) replicated and extended the procedures of Piazza et al. and included more features of the contingencies under which the elopement naturally occurred.

Tarbox et al. (2003) used a similar functional analysis procedure as described in Piazza et al. (1997) except that an alone condition was omitted because the type of elopement being investigated could not occur in the absence of other people. Additionally, the FA was implemented by caregivers and staff who worked with the participants. The participants in this study were Ethan, a 6-year-old diagnosed with Asperger's syndrome, and Robert, a 39-year-old man, and Mick, a 28-year-old man, who were both diagnosed with severe cognitive impairment. Prior to intervention, all participants required constant supervision due to the risk of elopement. The functional analysis and intervention for Ethan were conducted in the setting which elopement occurred, specifically an indoor shopping mall. The same procedures for Robert and Mick were implemented in their residential setting, the primary setting for elopement for these participants. The functional analyses resulted in significantly higher responding under tangible conditions for Ethan and Mick and during the attention condition for Robert. Functional communication training (FCT) was implemented as an intervention for Ethan and Mick, and NCR was implemented for Robert. Caregivers and staff also implemented the respective interventions. The interventions resulted in near-zero levels of elopement for both participants as well as significant increases in functional communication responses. These results demonstrated

the same functional analysis and intervention methods reported by Piazza et al. (1997) are an effective means to treat elopement in individuals with developmental disabilities. Tarbox et al. (2003) provided further support for the behavioral treatment for elopement in developmental disabilities. Their extension, using features of naturally occurring stimuli and consequences, was consistent with the recommendations of Stokes and Baer (1977), stating that a technology of generalization should include the integration of natural contingencies within the intervention. The results of Tarbox et al. provided an important foundation for further research as we move toward more adaptive, sustainable and socially valid treatments for elopement.

The possible necessity of punishment was investigated by Call et al. (2011) in their study evaluating the elopement of a 5-year-old boy diagnosed with ASD. An FA was conducted, similar to Piazza et al. (1997), which showed elopement was maintained by access to tangible items and attention. A DRO was implemented and evaluated using a reversal design in which the DRO procedure was implemented with and without response blocking. The results of the DRO without blocking as well as the DRO + VR2 were rates of elopement not dissimilar to that observed in baseline. The overall results of this study indicated that blocking may be an essential component of treating elopement for some individuals with developmental disabilities who engage in elopement behavior.

Previously, much of the intervention-oriented elopement research focused equally on the assessment and treatment process for elopement (e.g., Piazza et al., 1997; Tarbox et al., 2003), or it has emphasized the intervention over assessment (e.g., Call et al., 2011; Falcomata et al., 2010; Stevenson et al., 2016). Additionally, there is a separate body of literature focused primarily on the development of adapted, functional-analysis procedures including the brief functional analysis (e.g., Perrin et al., 2008); latency functional analysis (e.g., Davis et al., 2013; Neidert,

Iwata, Dempsey, & Thomason-Sassi, 2013); session-based methodology, which may be completed in a single room (e.g., Lehardy et al., 2013); trial-based functional analyses (e.g., Lambert, Finley, & Caruthers, 2017); and a latency-based, synthesized contingency analysis (e.g., Jessel et al., 2018). Perrin et al. (2008) addressed the concern that traditional FA methods, which may need to occur over the course of several days, as in Piazza et al. (1997) or Tarbox et al. (2003), may be impractical and cumbersome for many applied settings. The brief functional analysis methodology used by Perrin et al. was comprised of multiple repetitions of 5-min tangible, alone, play, demand, and attention conditions that took place within a single observation. The researchers developed FCT and NCR procedures based on the FA results to effectively reduce elopement behavior in two preschoolers diagnosed with ASD. This is significant as it provides a more accessible means of assessment for those working in applied settings. Also, it should be noted that this method, although more time-efficient, is not a far departure from the typical method described by Iwata, Dorsey, Slifer, Bauman, and Richman (1982/1994).

In 2013, two studies evaluated the utility and practicality of the latency-based functional analysis for the treatment of elopement in participants with intellectual disabilities (Davis et al., 2013; Neidert et al, 2013). Both studies cited that the assessment of elopement is difficult because the behavior terminates a session and it cannot reoccur without repeatedly intervening to return the individual to the original location. The interaction, which is inherent in the return procedure, may confound results by introducing unplanned attention-based consequences. To control for this, researchers from both studies proposed a latency functional analysis in which the time between the opportunity to respond and the onset of the response is measured across FA conditions. An 8-year-old boy (e.g., Davis et al., 2013) and 2 adult men (e.g., Neidert et al.,

2013) participated, and the results can be interpreted by considering that the shortest latencies likely indicate a functional relation between the behavior and the available consequence. The results of both studies indicated that the behavior of elopement was likely sensitive to multiple sources of reinforcement, specifically attention and access to tangibles in all cases. Although the data did not indicate the presence of a single controlling variable, it did provide sufficient information to develop effective interventions for all participants. FCT was evaluated by Davis et al. (2013), and FCT plus DRA for compliance with demands was evaluated by Neidert et al. (2013). These studies offer an alternative to the traditional model of functional analysis that controls for the confound of returning the participant. Although this method may be useful, it is important to review other options, which may provide a more-efficient way to obtain clearer results.

Jessel et al. (2018) completed the most-recent study by using another functional-analysis variation to evaluate elopement. Jessel et al. implemented a two-condition, interview-informed synthesized contingency analysis (IISCA) to determine the function of elopement. Next, they developed a comprehensive treatment package that first included training complex functional communication responses; then in a second phase, intermittently delaying and denying reinforcement. In the data presented previously by Hanley, Jin, Vanselow, and Hanratty (2014), this procedure was effective at reducing other problem behaviors to near-zero levels and increasing communication and delay tolerance in Hanley's seminal work on the IISCA. Jessel et al. (2018) extended this assessment and treatment package to the behavior of elopement. Two boys, ages 4 and 10 years, respectively, each diagnosed with ASD were included in this study. The functional analyses in this study included a single test condition and a matched control rapidly alternated in a multielement design. Using the same logic as Neidert et al. (2013) and

Davis et al. (2013), I used response latency as the dependent measure in these analyses, as multiple responses were not possible, and resetting presented a confound. The assessment procedures were designed using a structured interview (see Hanley et al., 2014) from which information to recreate conditions likely to evoke elopement for each participant were extracted. The researchers created analogue conditions in which the reinforcers (i.e., preferred items or people) could be available noncontingently (control condition) and contingently (test conditions). For both participants, very-short latencies were observed in the test conditions and long latencies (or no elopement) occurred in the control conditions. The results of these assessments informed FCT intervention development, which included graduated response complexity and delay and denial training. For both participants, elopement was reduced to zero levels during treatment and remained at those levels through reinforcement thinning and tolerance training.

Of the current research on elopement, Jessel et al. (2018) was the first study to include social validity data. These data were collected by administering a five-question, Likert-type scale survey. The results included a high degree of treatment acceptability, satisfaction with the outcomes, and efficacy on the part of caregivers beyond the experimental settings. One limitation worth highlighting was that the assessment and intervention were conducted in analogue settings that were quite different from the high-probability settings reported in the interview. For example, it was reported that one participant would elope toward mall fountains, and the analogue condition included a water bucket as the occasioning stimulus. Therefore, continued research using more naturalistic settings is needed.

Elopement among individuals with developmental disabilities is unfortunately a fairly common occurrence (Anderson et al., 2012). Additionally, it is one of the most stressful variables affecting the lives of already overloaded families with children diagnosed with ASD

(Anderson et al., 2012). It is incumbent on the community of behavior analysis to continue to develop effective treatments for socially important behavior such as this (Baer et al., 1968). There is a limited but slowly growing body of research to support a small variety of operant procedures that have been empirically validated (e.g., Call et al., 2011; Falcomata et al., 2010; Piazza et al., 1997; Tarbox et al., 2003), which can be used to bring elopement under control. Also, although social-validity data regarding elopement treatment has been introduced into the literature (Jessel et al., 2018), there is still a tremendous need for such data (Kennedy, 2002; Wolf, 1978). These behaviors are high risk and occur across settings, procedures are often highly restrictive (Davis et al., 2013; Jessel et al., 2018; Tarbox et al., 2003), and treatment fidelity can be inconsistent (Call et al., 2011). Additionally, it has been widely discussed that some typical assessment procedures can be cumbersome and impractical for applied settings (Lambert et al., 2017; Lehardy et al., 2013; Traub & Vollmer, 2019). For these reasons, the evaluation of an intervention, which might have strong social validity, allows for greater adaptability across settings, is developed in the context of naturally occurring contingencies, and is accessible would be a meaningful contribution to the behavior-analytic research on the concern of elopement for individuals with developmental disabilities.

The purpose of this study was to extend previous research on the behavior-analytic treatment of elopement in individuals with developmental disabilities (e.g., Jessel et al., 2018; Kodak et al., 2004; Piazza et al., 1997; Tarbox et al., 2003) by including the use of a Bluetooth signaling device to train return responses in public settings. These devices emit a sound that, following an operant-training procedure, comes to function as a discriminative stimulus for the availability of reinforcers on return. The use of these devices allowed for a greater range of adaptive and context-appropriate behavior than what has been published in previous research

(e.g., Davis et al. 2013; Jessel et al., 2018; Kodak et al., 2004; Tarbox et al., 2003). Self-efficacy data (Hastings & Symes, 2002) taken before and after treatment are presented to illustrate the procedure's effect on parent–guardian perceptions of capability with respect to implementing this intervention in high-probability conditions. These data are not presented to suggest a causal relation but a potential predictor of future parental behavior (Biglan, 1987). Last, treatment-acceptability data gathered are used to evaluate the social validity of this procedure. These extensions add to the empirical research on elopement by providing another option that may help to increase the social acceptability of not only our consumers but also our practices.

Chapter 3: Research Design and Method

Method

Participants

Three children along with a parent or guardian participated in this study. The children in this study were John, a 5-year-old Caucasian male, diagnosed with ASD who participated with his biological mother; Lauren, a 5-year-old Hispanic female who participated with her biological mother; and Michael, an 8-year-old diagnosed with ADHD and oppositional defiant disorder. Michael participated with his adoptive mother who, as a result of a stroke, had physical limitations that limited her mobility. The other parents participating did not have mobility limitations. Each child was referred to a behavioral health outpatient clinic for behavioral parent training and the treatment of running from adults in public, and each child used vocal, verbal language to communicate.

Setting

The Reinforcement Assessment for Individuals with Severe Disabilities (RAISD; Fisher, Piazza, Bowman, & Amari, 1996) was administered to each parent in their home. Reinforcer assessments were also conducted with Lauren and John in the family home. The setting in which experimental sessions were conducted varied by participant based on their idiosyncratic behavior patterns. John's mother identified their neighborhood park and a local retail store as having a high frequency of elopement whenever they went together. Consequently, the store and the park were the settings for both baseline and intervention sessions. Lauren's mother identified their neighborhood park as having a high frequency of elopement behavior; consequently, all baseline and intervention sessions were conducted at their neighborhood park. Michael's mother identified grocery stores, local retail stores, and the trailer park in which they lived as all being

settings where elopement frequently occurred. Baseline sessions were conducted in the grocery store and the retail store, and intervention sessions were conducted in the trailer park and the retail store.

Materials

The materials used in this research include the RAISD (Fisher et al., 1996) for the preference assessment and a Bluetooth signaling device that emitted a chirping sound. The specific brand of the Bluetooth device was the Tile Sport tracking device (more information on this product is available at www.thetileapp.com). The Tile Sport is a 40 × 40 × 5.9-mm device, which emits a chirping sound when signaled from a smartphone using Bluetooth technology. The experimenters used a 200' tape measure to measure distances of a sample of return responses (the number of feet between participant and caregiver at the time the return response was signaled and emitted) per setting. Four different colored buckets and 30 Lego bricks were used to complete the reinforcer assessment. Finally, the experimenters had reinforcers identified by the assessments as well as data collection materials.

Dependent Variable, Measurement, and Interobserver Agreement

The primary dependent variable was elopement. Elopement during baseline was defined as moving one’s whole body beyond a specific environmental marker (i.e., moving beyond a concrete barrier encircling the park and leaving the aisle the parent is in at the store). During intervention, elopement was defined as above with the addition of failing to stop or close the distance between participant and parent within 5 s of the chirping sound of the signaling device. A return was defined as the participant initiating movement that closed the distance between the participant and experimenter or caregiver within 5 s of the chirping sound of the signaling device.

Elopement was measured as either occurring or not occurring during a trial, and there were three trials per session. Data are presented as a percentage of occurrence of elopement per session. During baseline, each trial initiated with a verbal instruction from the parent and terminated if elopement occurred or if 10 min passed without elopement occurring. During intervention, trials initiated with an instruction from the parent and terminated if either elopement or a return response occurred.

A research assistant was present during 75% of all sessions (100% for John, 84% for Lauren, and 46% for Michael) to collect data independently to calculate interobserver agreement (IOA). Trial-by-trial IOA was calculated by dividing the total number of trial data with agreements by the total number of trials recorded then multiplying by 100% (Cooper, Heron, & Heward, 2007). Total IOA was 97% with a range from 92% to 100%.

Experimental Design

The intervention was evaluated using a nonconcurrent, multiple baseline across participants design (Kazdin, 2011). Phase changes from baseline to intervention occurred following stable responding for a minimum of three consecutive sessions in the participant's individual baseline. For the second and third participants, there was an additional criterion of a stable change in responding during the corresponding intervention phase for the participants who had already progressed into the baseline phase.

Reinforcer Assessment

The RAISD (Fisher et al., 1996), an indirect preference assessment, was administered with each participating parent. For John and Lauren, the stimuli that were ranked in the top four were selected to have their reinforcer effectiveness tested through a concurrent-operants reinforcer assessment (Catania, 1963) similar to that described by Piazza et al. (1997). Both

participants were independently instructed to complete one of four available tasks, specifically assembling interlocking bricks and putting them into one of four different colored bins. Each bin was associated with a different stimulus that was available contingent on putting assembled bricks into a given bin. The two stimuli that produced the most responses were subsequently used to reinforce return responses in the intervention phases of the experiment for John and Lauren. Michael verbally identified his most preferred stimuli, and the reinforcer assessment was omitted for this participant.

Baseline. During baseline sessions, each trial began with a clear verbal instruction from the parent to the participant, instructing them not to go past a specific environmental feature. For example, during sessions at the park both John and Lauren were instructed to not go beyond the concrete sidewalk that encircled the playground at radii between 50 and 100 feet. In the stores, John and Michael were instructed to not leave the aisle–section the parent was in (i.e., not to cross the threshold into another aisle–section or lose line of sight from the parent, though they could move with the parent from aisle to aisle). All environmental markers, such as the end of the aisle and the sidewalk, were clearly pointed out to participants at least once per session. Baseline trials terminated if elopement occurred or if 10 min passed without elopement. If elopement occurred, a research assistant blocked egress beyond the predetermined marker and prompted them to return to the parent. The parent would then remind the participant of the boundary, and a new trial would reset. Beyond a prompt to return from the research assistant and a reminder from the parent, no other consequences were programed, and the parents were instructed to interact with their children as they normally would.

Intervention. During this phase, participants were trained to respond to the sound of the signaling device by returning to their parent whenever they heard the signal, wherever they were.

If participants returned, they were able to select one of the stimuli identified in the preference and reinforcer assessments. Reinforcement occurred according to a fixed ratio 1 (FR:1) schedule. If participants failed to respond to the signal by initiating a return response within 5 s, they were prompted by one of the members of the research team. Prior to training in community settings, each participant received between three and five initial training trials in their home in which the signal was emitted and their parents would consequate all return responses with preferred stimuli. During initial training, all distances between parent and participant were under 10 feet when the signal was emitted, and three consecutive, unprompted return responses were required to initiate community training. No participant required more than five preparation trials in total.

Social validity and self-efficacy. Questions taken from the Challenging Behavior Self-Efficacy Scale (Hastings & Symes, 2002) were given to the parents to answer before baseline and between 2 and 4 weeks following the intervention. Parents were each asked three questions adapted from the Challenging Behavior Self-Efficacy Scale (Hastings & Symes, 2002) before beginning baseline and again at either one month (John and Lauren's parents) or 2 weeks (Michael's parent). Specifically,

1. How confident are you in dealing with the elopement behavior of the child with autism–developmental disability that you care for?
2. How difficult do you personally find it to deal with the elopement behavior of the child with autism–developmental disability you care for?
3. To what extent do you feel in control of the elopement behavior of the child with autism–developmental disability that you care for?

Parents were asked to respond to each question using a Likert-type scale, ranging from 1 (q.1 *not confident*, q.2 *very difficult*, q.3 *not in control at all*) to 7 (q.1 *very confident*, q.2 *not difficult at all*, q.3 *very much in control*).

At the completion of the intervention, all three parents were administered the TEI-SF (Kelley et al., 1989). Each parent either agreed or strongly agreed that this intervention was socially acceptable, they liked the procedures, it would likely result in permanent improvement, and they had a positive reaction. Furthermore, each parent disagreed with the statement, "I believe this child experienced discomfort during treatment." All data from the TEI-SF are displayed in Table 2.

Ethical Assurances

All participants were recruited by the author after having been referred to an outpatient, behavioral health clinic for the treatment of challenging behavior including elopement. The parents of each child participating in this study were informed of the purpose, the procedures, the risks to participation, alternatives to participation, and our procedures for maintaining confidentiality. Written informed consents were signed by the parents of all participants to this effect. The Institutional Review Board (IRB) of The Chicago School of Professional Psychology determined that this study met the requirements for expedited review and approved the initiation of the present study. Research materials will be kept for a minimum of 5 years after publication per the American Psychological Association (APA) guidelines. All data collection materials will be stored in research files kept in a secure electronic cloud drive. Data will be kept in a locked cabinet for a minimum of 5 years prior to destruction. Any hard copies of data sheets will be shredded, and all electronic data files will be destroyed. Pseudonyms were used for all participants in this study to maintain confidentiality.

Chapter 4

Introduction

The experimental procedure for this study involved measuring frequency of elopement in a multiple baseline across participants design. Other data used to inform intervention procedures and evaluate treatment acceptability and potential durability included data from indirect preference assessments, reinforcer assessments, interobserver agreement, treatment acceptability rating scales, and challenging behavior self-efficacy.

Preference and Reinforcer Assessments

Results of the RAISD for John indicated that gummy bears, goldfish, pretzels, and sour gummy worms would potentially have the most reinforcing value of all practical stimuli identified. Other items, such as electronic (e.g., tablet or game) time, were deemed impractical for use in community settings because they do not travel well and contact sufficient enough to be reinforcing was incompatible with the community activity (i.e., playing at the park or shopping). The reinforcer assessment with John showed that Goldfish reinforced the most behavior at 33%, followed by gummy bears and pretzels each at 24%. Since gummy bears and pretzels indicated equal reinforcing capacity, gummy bears were selected over pretzels based simply on parent preference. Data showing the results of John's reinforcer assessment are displayed in Figure 1.

For Lauren, the RAISD indicated that access to the family's trampoline was highly preferred, but this item was eliminated for practicality reasons. Items in the reinforcer assessment included sour gummy worms, Goldfish, jellybeans, and gummy bears. The reinforcer assessment showed that Goldfish were the most reinforcing stimuli at 55%, and sour gummy worms were next at 24%. Reinforcer assessment data for Lauren are displayed in Figure 1.

For Michael, the RAISD indicated that gummy worms and Goldfish would be among the most practical preferred stimuli. Michael confirmed verbally that these were both things that he enjoyed. Both stimuli were used to reinforce return responding in Michael's intervention.

Intervention Evaluation

The results of John's intervention showed a significant and immediate reduction in elopement behaviors from the onset. During baseline, John engaged in elopement behavior between 66% and 100% of trials. After the initial training session and during intervention, there were zero instances of elopement. John's data remained stable and unchanged through the completion of sessions for this study.

During baseline, Lauren engaged in elopement between 66% and 100% of trials in the community. Elopement responding dropped to between 0% and 33% after the initial training trials and during intervention. Although there was some variability in Lauren's responding during intervention, elopement was still significantly reduced and relatively stable.

Similar to the other 2 participants, Michael engaged in high rates of behavior, between 66% and 100% of all trials during baseline. After training and during intervention, his rates of elopement reduced significantly as he acquired responding to the remote signaling device. During intervention, Michael did not engage in any elopement behavior. Results from all 3 participants are shown in Figure 2.

Self-Efficacy Data

At one month after the intervention John's parent responded to question 1 with a 3 and a 6 at follow-up, indicating a 45% increase in her self-efficacy perception in that area. For question 2, there was a 43% increase in self-efficacy perception; for question 3, there was a 29% increase in self-efficacy perception. In total, John's parent reported an average of 38.33% increase in self-

efficacy perception one month after the intervention. At one-month postintervention, Lauren's parent reported a 14% increase in self-efficacy perception for question 1, 57% increase for question 2, and 43% increase for question 3, with an average increase in self-efficacy perception of 38%.

Two weeks postintervention, Michael's parent reported a 71% increase in self-efficacy perception for question 1, and an 85% increase for questions 2 and 3 with an average increase in self-efficacy perception of 80.33%. All self-efficacy data are displayed in Table 1 and Figure 3.

Chapter Summary

In summary, the elopement of each participant was significantly reduced from baseline rates after a brief training of return responses and introducing the wearable, remote signaling device in community settings. In addition to this data yielded to support this procedure as an effective treatment for elopement in children with ASD and developmental disabilities, parents also rated it as highly acceptable. Furthermore, parents showed significant increases in their self-efficacy perception with respect to their confidence in dealing with elopement and their control over the situation, and they indicated a significant decrease in difficulty level of dealing with elopement.

Chapter 5: Summary, Conclusions, and Recommendations

Interpretation of Findings

The results of this study indicate a strong functional relationship between the independent and dependent variables and support the use of remote signaling devices as an effective method in preventing elopement in community settings for individuals with ASD and other developmental disabilities. In addition to the procedure's apparent effectiveness for the treatment of a significant social concern, it offers a modality that may be more acceptable to consumers, be more adaptive across settings, and be an option for parents who, due to mobility challenges, find other procedures (e.g., Tarbox et al., 2003) difficult if not impossible. As discussed previously, other empirically supported protocols require that participants remain within close proximity to caregivers (e.g., Kodak et al., 2004; Piazza et al., 1997; Tarbox et al., 2003). Although this has been shown to be effective, it may not be contextually appropriate for all settings such as parks and playgrounds. This protocol allows for greater distances from caregivers across settings, which may contribute to its high acceptability. As an example, this procedure allowed participants to be anywhere from 20 to 100 feet from their parents at parks, and return responses could still be signaled when the participants' distance neared the limitations of their parents' comfort. In multiple instances, return responses were signaled as children ran toward streets or parking lots, and the course of their elopement was interrupted when a return response was signaled by an observing parent. For the purposes of this study, the research team was in place to ensure the safety of the participants during trials, but these examples provide anecdotal support for the utility of this procedure in community settings.

In addition to the adaptability of this procedure for certain community settings, it was also uniquely useful for Michael's mother, who struggled with Michael's elopement in all

settings. She expressed great concern for his safety and reported that the problem was very difficult to manage and that she had little control over it and little confidence in managing it. Moreover, due to her physical disability she would not have physically been able to use the strategies published by Tarbox et al. (2003) or Kodak et al. (2004), for example. Once she was trained to implement the procedure and observed the effect, she not only reported that she found the procedure highly acceptable but also her perceived-self efficacy with respect to elopement increase dramatically from pre- to postintervention. Although self-efficacy should not be interpreted as having a causal relation, it may have influence over the degree to which the procedure is used with fidelity over time, the level of community interaction, and contact with other reinforcement relevant to future behavioral development and quality of life. Overall, there were significant increases in self-efficacy reporting from all parents, and all participants found the procedure to be an acceptable and effective way to treat the elopement for their children.

Similar to the Tarbox et al. (2003) study, this study was conducted using the participants' parents in settings in which elopement typically occurs. I concur with the statement of those researchers that "Conducting assessment and treatment sessions under familiar stimulus conditions may take advantage of naturally occurring contingencies and may facilitate treatment generalization" (Stokes & Baer, 1977, p. 243). Conducting this research in natural settings, with natural caregivers was an important component of this research that may contribute to the generality and longevity of the effects observed.

Recommendations

Considerations for future research include the need for replication to analyze effects across a larger sample. Although the data presented here show initial promise, a treatment effect among a larger group might provide more conclusive or compelling results. Furthermore, these

results should be replicated across different populations, for example, adults with developmental disabilities and degenerative neurological diseases such as Alzheimer's disease and dementia. Elopement is a significant concern in this population (Chung & Lai, 2011), and a similar procedure may find purchase in this community as well.

Another consideration for future research is schedule thinning. During all interventions, return responses were reinforced according to an FR:1 schedule. Schedule thinning and delaying reinforcement were both explored by Jessel et al. (2018) and Piazza et al. (1997), and it was evident that treatment effects could maintain if reinforcement ratios were systematically increased and delay to reinforcement was increased. This aspect was not explored in my research and should be considered in any future replication or extension.

Conclusion

The concern of elopement for individuals and families affected by ASD and developmental disabilities cannot be overstated. This is a high-incidence, high-risk behavior and an area that has received relatively little attention from behavior-analytic researchers. There are clear demonstrations that elopement can be brought under operant control and that effective intervention packages can be developed to treat it, and modern technology might allow consumers an option that allows for a more adaptive intervention that is more accessible to families than other empirically supported interventions. This research supports the effectiveness of using remote signaling devices to prevent elopement and train return responding in children with disabilities. Furthermore, data are provided to support the overall acceptability of this treatment as well as to indicate that parents trained to implement this procedure may have more confidence and control and might find their child's elopement significantly less difficult to manage in the community. The significant changes in self-efficacy reports may suggest a certain

fidelity and durability to the intervention and behavior change observed in this study, but future research is needed to evaluate such a relationship. As advances are made in the world at large, it is incumbent on behavior analysts and behavior analysis to invent creative ways to apply developing technologies in the service of socially significant behavior change.

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Tables

Table 1

Self-Efficacy Perception Ratings

Self-Efficacy Scale Questions	Pre	Post	Difference	Change (%)	Average
John's parent					
How confident are you in dealing with the elopement behavior of the child with autism that you care for?	3	6	3	+43%	
How difficult do you personally find it to deal with the elopement behavior of the child with autism you care for?	3	6	3	+43%	
To what extent do you feel in control of the elopement behavior of the child with autism that you care for?	3	5	2	+29%	+38.33%
Lauren's parent					
How confident are you in dealing with the elopement behavior of the child with autism that you care for?	4	5	1	+14%	
How difficult do you personally find it to deal with the elopement behavior of the child with autism you care for?	1	5	4	+57%	
To what extent do you feel in control of the elopement behavior of the child with autism that you care for?	3	6	3	+43%	+38%
Michael's parent					
How confident are you in dealing with the elopement behavior of the child with autism that you care for?	1	6	5	+71%	
How difficult do you personally find it to deal with the elopement behavior of the child with autism you care for?	1	7	6	+85%	
To what extent do you feel in control of the elopement behavior of the child with autism that you care for?	1	7	6	+85%	80.33%

Note. Pre = Assessment data collected prior to intervention; Post = Assessment data collected after the intervention.

Table 2

Treatment Acceptability Ratings

Treatment Acceptability Scale Questions	Response
John's parent	
I find this treatment to be an acceptable way of dealing with this child's behavior	Agree
I would be willing to use this procedure if I had to change this child's behavior	Strongly agree
I believe that it would be acceptable to use this treatment without this child's consent	Strongly agree
I like the procedures used in this treatment	Strongly agree
I believe this treatment is likely to be effective	Strongly agree
I believe this child will experience discomfort during treatment	Disagree
I believe this treatment is likely to result in permanent improvement	Strongly agree
I believe it would be acceptable to use this treatment with individuals who cannot choose treatments for themselves	Strongly agree
Overall, I have a positive reaction to this treatment	Strongly agree
Lauren's parent	
I find this treatment to be an acceptable way of dealing with this child's behavior	Agree
I would be willing to use this procedure if I had to change this child's behavior	Agree
I believe that it would be acceptable to use this treatment without this child's consent	Agree
I like the procedures used in this treatment	Agree
I believe this treatment is likely to be effective	Agree
I believe this child will experience discomfort during treatment	Disagree
I believe this treatment is likely to result in permanent improvement	Agree
I believe it would be acceptable to use this treatment with individuals who cannot choose treatments for themselves	Agree
Overall, I have a positive reaction to this treatment	Agree
Michael's parent	
I find this treatment to be an acceptable way of dealing with this child's behavior	Strongly agree
I would be willing to use this procedure if I had to change this child's behavior	Strongly agree
I believe that it would be acceptable to use this treatment without this child's consent	Strongly agree
I like the procedures used in this treatment	Strongly agree
I believe this treatment is likely to be effective	Strongly agree
I believe this child will experience discomfort during treatment	Strongly disagree
I believe this treatment is likely to result in permanent improvement	Strongly agree
I believe it would be acceptable to use this treatment with individuals who cannot choose treatments for themselves	Strongly agree
Overall, I have a positive reaction to this treatment	Strongly agree

Figures

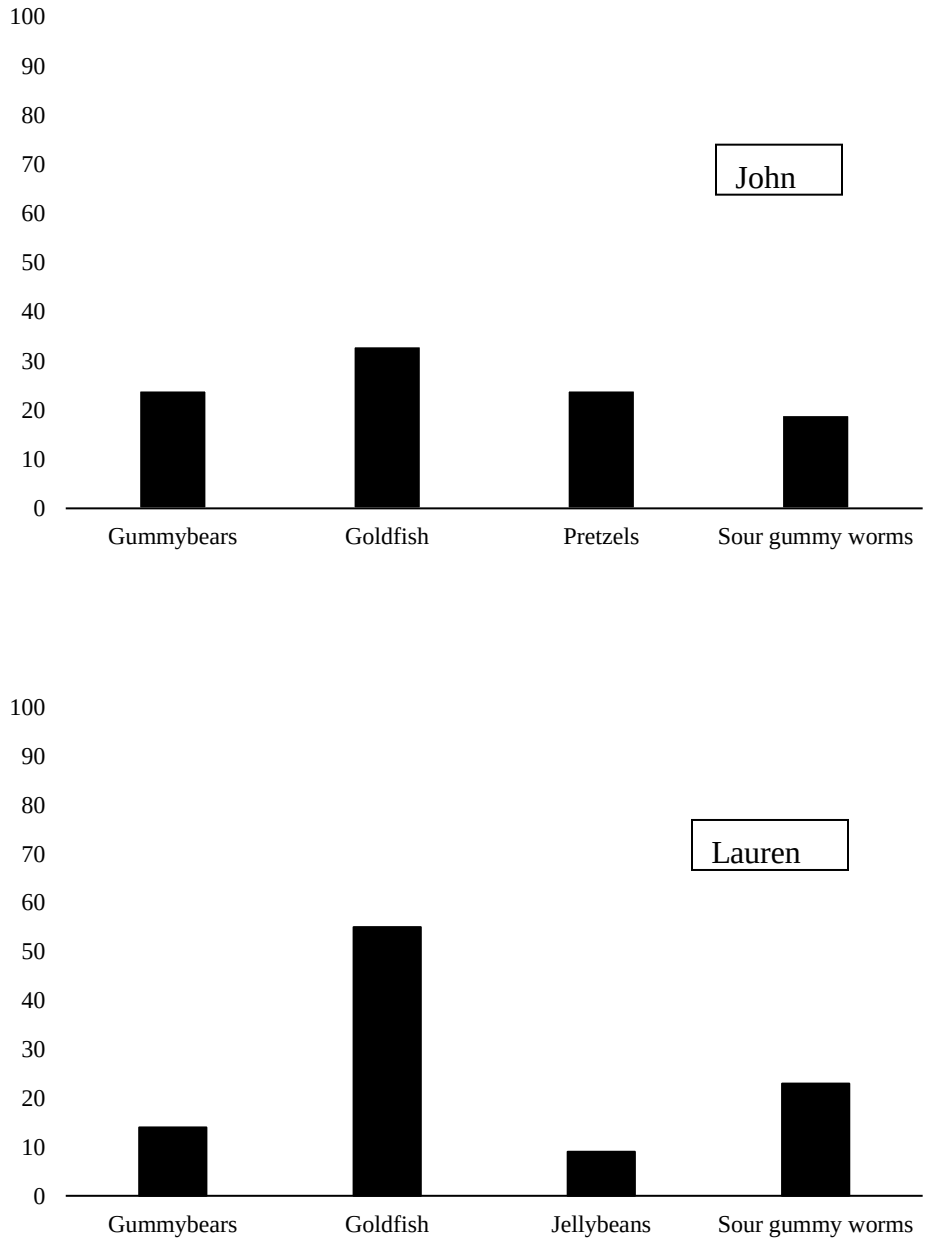

Figure 1. Results of reinforcer assessments conducted with John and Lauren.

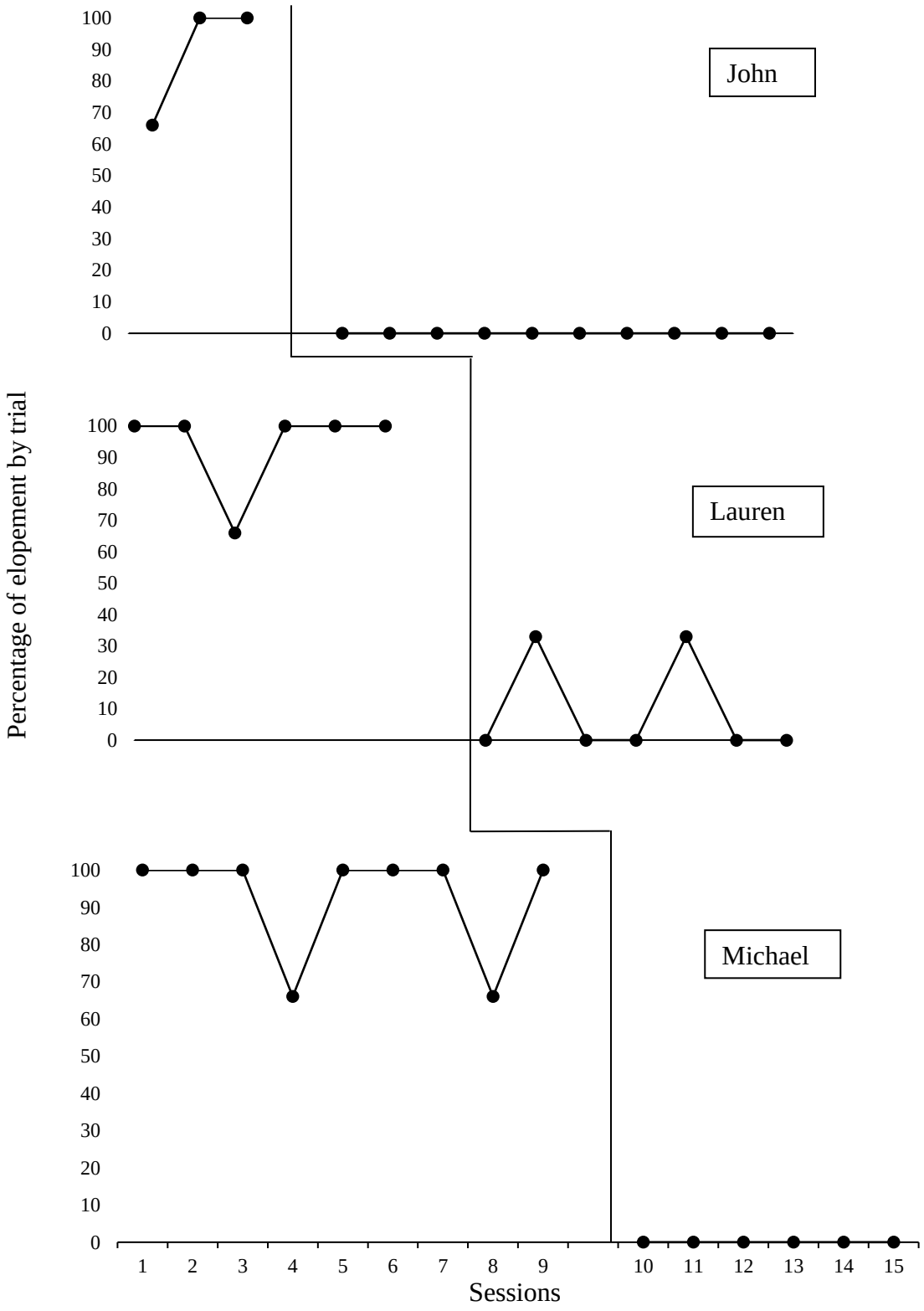

Figure 2. Percentage of trials in which elopement occurred per session.

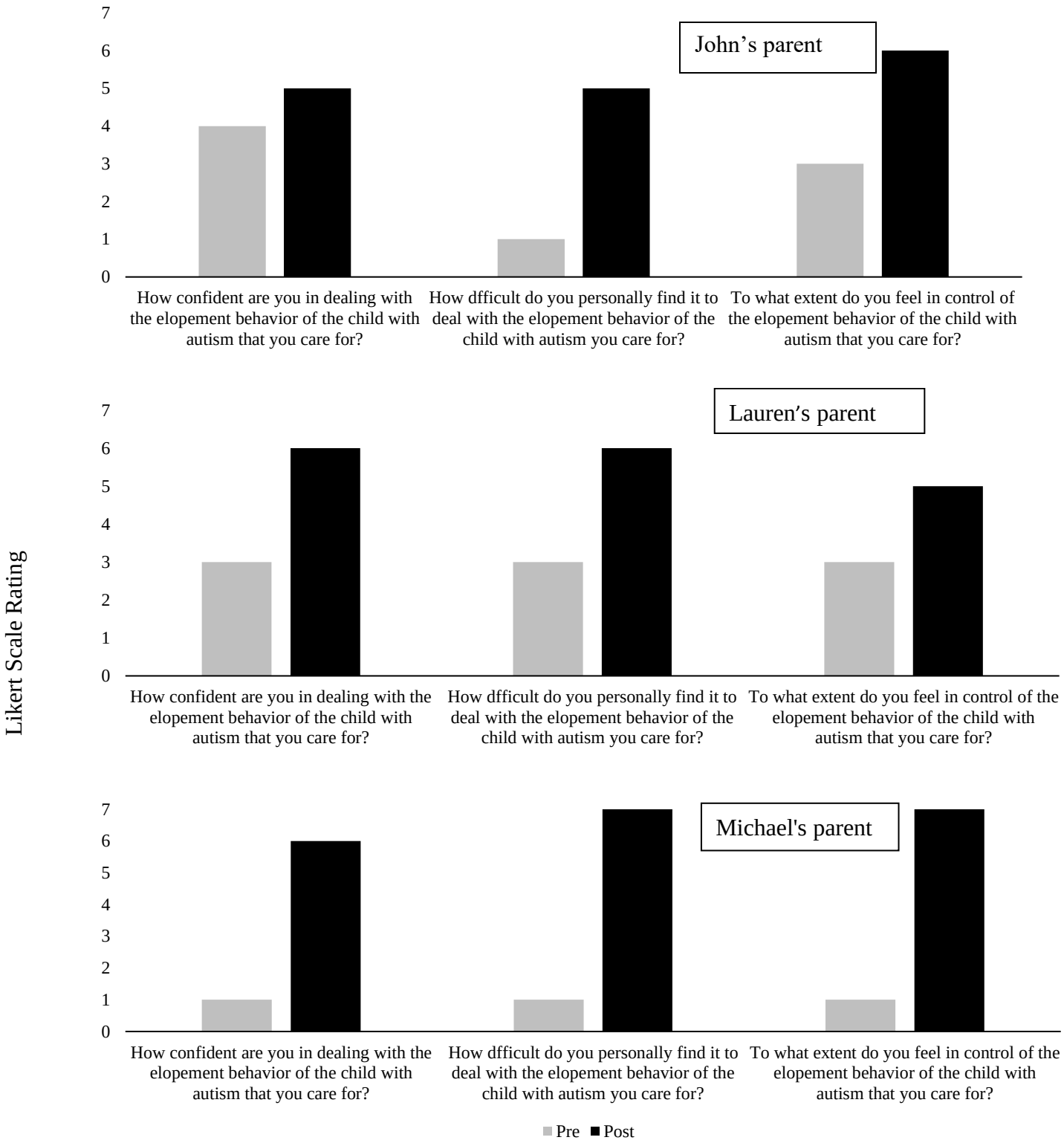

Figure 3. Results of Challenging Behavior Self-Efficacy Scale taken before and at 2 weeks (Michael) and one month (Lauren and John) posttreatment. The Likert-type scale ranged from 1 (*not confident at all*, *very difficult*, or *not in control at all*) to 7 (*very confident*, *not difficult at all*, or *very much in control*).

Appendix A: Informed Consent

Informed Consent

Investigators: Ehren J. Werntz

Study Title: An Evaluation of a More-Adaptive Treatment of Elopement Using Modern

Technology for Children With Developmental Disabilities

I am a student at The Chicago School of Professional Psychology. This study is being conducted as a part of my thesis requirement for my PhD in Applied Behavior Analysis.

I am asking you to participate in a research study. Please take your time to read the information below and feel free to ask any questions before signing this document.

Purpose: With this study I hope to provide evidence to support the use of a positive reinforcement procedure that incorporates the use of a Bluetooth signaling device in order to prevent children who run and/or wander (a.k.a. elope) from their parents in public.

Procedures: During the course of this intervention participating you and your child will meet with me and my research team at public locations where running and/or wandering has occurred before.

Next, you and your child will meet with the research team at Arizona Autism United to work with myself and my research team on training the children to respond to the device by returning to parents when a signal is emitted from a wearable device.

Finally, after this training process, you and your child will complete the procedure by returning to the place where running and wandering had previously occurred to continue the training in the natural environment with the research team.

Participation in this study will involve meeting the research team for 2-hr sessions twice a week for up to 4 weeks.

Risks to Participation:

1. Because names and email addresses will be used for recruiting and the informed consent form contains your signature there is a potential for a breach of confidentiality. To minimize this risk no identifying information will be kept on data sheets. In any written material, participants will be assigned numbers instead of identifying information. The only people that will have access to the data include me, my research assistants, and my dissertation chair. Signed consent forms will be kept in a locked file and only I, and my

dissertation chair upon request, will have access to those documents. Any necessary transmission of the consent forms will be sent via secure email.

2. Running and wandering, the behavior target for intervention in this study can result in physical harm if permitted to occur in public settings. A research team will be in place to minimize this risk.
3. Temporary stress associated with redirection and a restricted ability to elope in familiar places is a risk to children in this research. To minimize this risk, sessions will be terminated if there is any outward indication of pain or unusual distress and/or if your child requests to be done. At this point your child will be asked if he/she wants to continue or if he/she wishes to be finished with the study. Due to the potential for communication impairments, parents will be asked to assist with the interpretation of a response if necessary.

Benefits to Participants: The benefits to individual participants if the intervention is successful may include greater access to community settings if the risk of elopement has been reduced. Additionally, the intervention under investigation is one that could allow your child greater freedom compared to other published interventions for elopement. If the results support the effectiveness of this intervention it could offer a less restrictive treatment for elopement for others with similar behavioral challenges.

Alternatives to Participation: Participation in this study is voluntary. You may withdraw from study participation at any time without any penalty. Your decision to participate or not participate will not affect the treatment received at Arizona Autism United Inc.

Confidentiality: During this study, information will be collected about you, including your name and email for the purpose of this research. This includes clinical data on participation.

Clinical data, including rates of your child's elopement during sessions and the results of satisfaction surveys, may be used for publication and presentation at a professional conference.

Research materials will be kept for a minimum of 5 years after publication per the American Psychological Association (APA) guidelines. All data collection materials will be stored in research files kept in a secure electronic cloud drive. Data will be kept in a locked cabinet for a minimum of 5 years prior to destruction. Any hard copies of data sheets will be shredded, and all electronic data files will be destroyed.

Your research records may be reviewed by federal agencies whose responsibility is to protect human subjects participating in research, including the Office of Human Research Protections (OHRP) and by representatives from The Chicago School of Professional Psychology Institutional Review Board, a committee that oversees research.

Questions/Concerns: If you have questions related to the procedures described in this document please contact me at 602-561-2309 or ewerntz@ego.thechicagoschool.edu and/or my dissertation chair, Dr. Julie Ackerlund-Brandt at 312-488- 6096 or jbrandt@thechicagoschool.edu.

If you have questions concerning your rights in this research study you may contact the Institutional Review Board (IRB), which is concerned with the protection of subjects in research project. You may reach the IRB office Monday–Friday by calling 312-467-2343 or writing: Institutional Review Board, The Chicago School of Professional Psychology, 325 N. Wells, Chicago, Illinois, 60654.

Consent to Participate in Research

Parent/Guardian/Legally Authorized Representative:

I have read the above information and have received satisfactory answers to my questions. I understand the research project and the procedures involved have been explained to me. I give my permission for my child/relative/conservatee to participate in this research project. My child/relative/conservatee's participation is voluntary, and I do not have to sign this form if I do not want him/her to be part of this research project.
I will receive a copy of this consent form for my records.

_____
Name of Child/Relative/Conservatee Participant (print)

_____
Name of Parent/Guardian/Legally Authorized Representative (print)

_____
Signature of Parent/Guardian/Legally Authorized Representative

Date: _____

_____
Name of the Person Obtaining Consent (print)

_____
Signature of the Person Obtaining Consent

Date: _____

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