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A REVIEW OF THE USE OF ADVANCE NOTICE AS AN INTERVENTION FOR TRANSITION RELATED PROBLEM BEHAVIOR: IMPLICATIONS FOR PRACTICE AND FUTURE RESEARCH

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Abstract

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Tolerating transitions between activities and locations is an essential daily-living skill, as transitions are inevitable in most typical settings. However, for some individuals, requests to transition may occasion problem behavior which can interfere with daily routines and result in a more restrictive lifestyle. The unpredictability of transitions is often assumed to be aversive and functionally related to transition-related problem behavior. As a result, advance notice procedures are often recommended to reduce problem behavior during transitions. However, Brewer et al. (2014) found mixed results for the use of advance notice highlighting some studies where advance notice procedures reduced problem behavior and others where the procedures were inefficacious. In this study, we reviewed the relevant literature between 1994 and 2020, including studies reviewed by Brewer et al. (2014) and extended Brewer et al.'s (2014) review in a number of ways. We first summarized the current literature, including new studies published since Brewer et al.'s (2014) review, which included a total of 28 applications of advance notice published in 14 papers. Next, we identified key features of each study, including the presence or absence of demonstrated functional relations, inclusion of additional antecedent or consequent interventions, and evaluation and control of the effects of pre- and post-transition reinforcers on responding. Then we identified gaps in current knowledge regarding predictability and made

research recommendations for addressing these gaps. Finally, we discuss practice recommendations for transition-related problem behavior based on current research.

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CHAPTER 1: INTRODUCTION

Problem Behavior During Transitions

Transitions between locations and activities are an essential and unavoidable part of everyday life. Both home and school settings often involve frequent demands to physically transition from highly preferred activities to less preferred and even aversive activities. Demands to transition between activities can evoke both minor and severe forms of problem behavior, requiring intervention (McCord et al., 2001; Sainato, et al., 1987). This is particularly relevant for children diagnosed with autism spectrum disorders (ASD), whose difficulties with transitions and inflexible adherence to routines, as identified by the DSM-5 (American Psychiatric Association, 2013), often interfere with daily activities and instructional contexts. More severe topographies of problem behavior, such as aggression and self-injurious behavior resulting from requests to transition, pose the risk of serious harm to children as well as caregivers and can limit access to community, educational, and recreational settings. Even less severe topographies of problem behavior (e.g., non-compliance, stereotypy) can be disruptive for the individual and their social or educational circle (e.g., lost instructional time). Early intervention may be critical for addressing these behavioral problems to reduce negative long-term outcomes (Kalb & Loeber, 2003).

Advance Notice

The use of advance notice as a treatment to reduce unpredictability and subsequent problem behavior was first introduced by Flannery & Horner (1994) over 25 years ago, and has been cited over 150 times (Google Scholar). Flannery and Horner (1994) argued that problem behavior is evoked by the unpredictability of transitions and is therefore reduced when advance

notice removes this unpredictability. Not surprisingly, a common recommendation to reduce transition-related problem behavior among children diagnosed with ASD is to use an advance notice of the upcoming transition (Brewer et al., 2014; Spriggs et al., 2015). Advance notice procedures can take many forms; some of the most common forms are verbal warnings (Cote et al., 2005; McCord et al., 2001), use of visual schedules (Dettmer et al., 2000; Dooley et al., 2001), and video priming (Schreibman et al., 2000).

For the purposes of this review, advance notice refers to any procedure that uses signals to increase the predictability of upcoming events by indicating when or what the next activity will be during a transition. Conceptually, predictability can be operationalized as a presentation of signals that indicate the availability of specific reinforcement or punishment contingencies (Flannery & Horner, 1994). Proponents of advance notice for transitions (e.g., visual schedules, first-then boards) often assume that the maintaining variable for transition-related problem behavior is escape from the unpredictable nature of transitions (i.e., the post-transition activity; Flannery & Horner 1994; Schreibman et al., 2000; Vasquez et al., 2017). A preference for predictability and sameness is often assumed to be a defining characteristic for children with autism (American Psychiatric Association, 2013). Thus, the rationale for using advance notice is predicated on the idea that increased predictability reduces the aversive aspects of transitions (Brewer et al., 2014). Conversely, unpredictable arrangements are assumed to be universally aversive, resulting in commonplace recommendations that aim to reduce any sudden or unexpected changes in activities through advance notice (Brewer et al., 2014). Additionally, parent reports of high acceptability and ease of implementation of advance notice interventions have further contributed to their common usage (Robertson, 2016).

Assuming unpredictability is the aversive variable functionally related to transition-related problem behavior in transition arrangements, advance notice should reliably reduce this problem behavior. Yet, despite the widespread recommendations and endorsements (e.g., Hume et al., 2014), empirical evidence for the efficacy of advance notice procedures to treat transition-related problem behavior has been mixed. Some researchers have reported positive effects, such that advance notice results in reductions of problem behavior (Dettmer et al., 2000; Schmit et al., 2000), while others report no effect (Cote et al., 2005; McCord et al., 2001; Waters et al., 2009). Although researchers evaluating advance notice procedures often cite Flannery and Horner (1994) as evidence for the functional role unpredictability plays with regard to problem behavior (Schmitt et al., 2000; Schreibman et al., 2000; Vasquez et al. 2017), it is unclear how many applied treatment studies have been conducted to evaluate the functional relation between unpredictability and problem behavior prior to implementing an advance warning procedure.

However, the functional role of predictability has been evaluated in basic research with animal subjects (Everly et al., 2014; Langford et al., 2019; Perone & Courtney, 1992) and in translational studies with humans (Jessel et al., 2016). Basic researchers have evaluated animals' responding during transitions between schedules of reinforcement in mixed schedule arrangements where upcoming reinforcement schedule are unsignaled (unpredictable), and multiple schedule arrangements where upcoming reinforcement schedules are signaled (predictable). In signaled arrangements, animals respond quickly to upcoming rich reinforcement schedules but engage in extended pausing when presented with a lean reinforcement schedule. Extended pausing is not observed in unsignaled arrangements (Langford et al., 2019). These results suggest that using advance notice for transitions to relatively less reinforcing contexts may exacerbate transition-related problem behavior. In fact,

these findings were demonstrated by Jessel et al., (2016) who showed that participants' pausing increased whenever they were instructed to transition from rich to signaled lean reinforcing contexts. Furthermore, when the signals indicating the upcoming transition were removed, participants' pausing decreased. Therefore, the inclusion of basic and translational findings may provide a conceptual framework from which to evaluate the use of advance notice procedures in applied setting and may provide a key to clarifying the mixed applied results.

In their review of the advance notice literature, Brewer et al. (2014) concluded that advance notice, alone or in combination with other interventions, was beneficial whenever problem behavior appeared to be functionally related to unpredictability. However, this conclusion may be premature given the findings from basic and translational research showing that it is not so much the transition itself, but the context to which the individual or animal is transitioning to or from that is functionally related to problem behavior. Although Brewer et al. (2014) summarized studies showing some positive findings in support of advance notice for treatment of transition-related problem behavior, they did not evaluate the extent to which predictability was shown to be *functionally* related to reductions in problem behavior. Without a functional analysis and information about the transition contexts, the extent to which advance notice is a function-based treatment for transition-related problem behavior is unclear.

Identifying Functional Relations: Why It Matters for Advance Notice Interventions

A functional relation refers to a cause-and-effect relationship between the environment and behavior. The function of a behavior refers to the effect that the behavior has on the environment. Function-based treatments, treatments designed to address the function of behavior using experimental demonstrations of a functional relation, yield more efficacious treatments than non-function-based treatments (Ingram et al., 2005). Functional behavioral

assessments are vital for identifying the reinforcement contingencies that maintain problem behavior. A specific type of functional behavior assessment, known as the functional analysis (FA), is an experimental arrangement designed to identify antecedent and consequent variables functionally related to the occurrence of problem behavior. Researchers have demonstrated repeatedly that FAs are the only reliable method for identifying functional relations (Beavers et al., 2013; Hagopian et al., 2013; Hall, 2005; Hanley et al., 2003; Pence et al., 2009; Thompson & Iwata, 2007). Furthermore, treatments based on FAs produce greater reductions in problem behavior than those that are not (Campbell, 2003). Since the FA methodology was first developed by Iwata et al., (1982/1994), hundreds of studies have been published demonstrating their efficacy at identifying variables maintaining problem behavior, including direct replications, systematic replications, and extensions with varying methodology (Hanley et al., 2003).

Functional analyses are the building blocks of function-based treatments. The variables maintaining problem behavior are first identified through a functional analysis, and are then used in treatment in order to reduce or replace problematic behavior while simultaneously addressing the relevant establishing operations and reinforcers involved. Several reinforcement contingencies may be functionally related to problem behavior emitted during transition demands in typical environments. The most common consequence is often the termination of the demand to transition. However the exact aspect of the transition demand that may be aversive in this situation is unclear. Termination of the transition demand allows the individual access to preferred pre-transition activities, escape from aversive post-transition activities, as well as escape from the aversiveness of the unpredictable nature of the transition if the next activity is unknown. These contingencies may indicate problem behavior is maintained by positive

reinforcement in the form of access to preferred activities, negative reinforcement in the form of escape from non-preferred activities, negative reinforcement in the form of escape from unpredictable environments, or a combination of these reinforcement contingencies. Depending on the contingency maintaining the individual's transition-related problem behavior, different treatments will be efficacious. For example, if problem behavior is maintained by access to preferred pre-transition activities or escape from an upcoming activity, an intervention of differential reinforcement and extinction should be used. If problem behavior is maintained by an escape from unpredictability, then advance notice may be efficacious in reducing problem behavior.

In summary, unpredictability during transitions is often assumed to be an aversive variable that evokes problem behavior. However, the results of advance notice as an intervention for transition related problem behavior have been mixed, with some applications showing positive effects and others showing no effects. Data from basic and translational research suggest that we must know something about the transition contexts to understand the functional relationship between unpredictability and problem behavior. Thus, the purpose of this paper was to review all published, applied research in which experimental designs were used to assess the effects of advance notice on transition-related problem behavior, to ascertain the extent to which transition-related problem behavior is functionally related to predictability, transitions contexts, and other relevant variables.

CHAPTER 2: METHODS

General Procedures

We conducted a literature search of studies published between 1994 and 2020 using *PsychInfo* and *Google Scholar*. We chose the year 1994 as the starting point because that is when Flannery and Horner (1994) published their seminal article first demonstrating the relation between unpredictability and problem behavior; their article has been cited over 160 times and has been cited as the foundational paper supporting the use of advance notice for transition-related problem behavior (Brewer et al., 2014). The key words searched for included *transitions, problem behavior, advance notice, predictability, visual activity schedules, visual supports,* and *autism.* We reviewed the reference lists from published review papers (Brewer et al., 2014; Knight et al., 2014; Koyama et al., 2011; Lequia et al., 2011) and all papers identified in the "cited by" pages in *Google Scholar* that met the inclusion and exclusion criteria (described below).

Inclusion and Exclusion Criteria

Studies were included in the review if they met the following criteria: (a) used single subject research design; (b) involved a participant transitioning between different locations or activities; (c) included at least one participant who engaged in some problem behavior during transitions; (d) used some form of advance notice in at least one component of the treatment. Studies that did not meet all four of these inclusion criteria were excluded from the review. For example, we excluded studies in which transition-related problem behavior was not directly addressed and instead a form of advanced notice, such as visual activity schedules, were used to teach on-task behavior (e.g., Cudahar & Diken, 2011; Flannery & Horner, 1994, Study 1;

Watanabe & Sturmey, 2003) complex chains of behavior (e.g., Carlile et al., 2013; Morrison et al., 2002), or reduce problem behavior that was not transition-related (Machalicek et al., 2009). Additionally, research related to transition-related problem behavior was not included if an advance notice procedure was not evaluated (e.g., Castillo et al., 2016).

Coding Procedures

We next evaluated all the studies that met the inclusion criteria to identify all applications within each study. An application was defined as the use of an advance notice procedure to reduce problem behavior with at least one participant. Each application was then coded across the following characteristics: (a) participant characteristics including age, gender, and diagnosis (b) treatment effects (c) treatment context, (d) type of advance notice procedure evaluated, (e) experimental design, (f) if additional treatment components were included (i.e., extinction, differential reinforcement, choice, noncontingent reinforcement, high probability sequencing), (g) if the activities at the pre and post transition contexts were kept constant, (h) if reinforcer values of the pre and post transition activity were evaluated in a preference assessment (i) the nature of the transition (i.e., transitioning from rich to lean, lean to rich, unclear), (j) if advance notice was evaluated as a single component treatment, (k) if a functional analysis was conducted prior to implementing treatment, and (l) if problem behavior was demonstrated to be functionally related to unpredictability. Operational definitions for each category are listed in Table 1. Because of the complexity of coding treatment effects, this process is described below in more detail.

Treatment effects were coded as either positive effects or no effects. Positive effects were defined as those in which advance notice resulted in 80% or more reductions in problem behavior between the mean of the first three baseline data points and mean of the last three

treatment data points in the advance notice phase (Ghaemmaghami et al., 2020). That is, if the mean of the last three data points in the last phase of advance notice was 80% lower than the mean of the first three baseline data points, we considered this a positive effect; anything less than 80% was considered no effect. Calculations for problem behavior were the same regardless of whether the data were presented as rate, frequency, or percentage of intervals. Data from study 2 in Flannery and Horner (1994) illustrate an example of a *positive effect*, where the mean rate of problem behavior of the first 3 data points in the random schedule phase is approximately 0.9 times per minute and the mean rate of problem behavior of the last 3 data points in the random predictable schedule phase is 0 times per minute, resulting in 100% reduction in problem behavior. A code of *no effect* was defined as less than 80% reductions in problem behavior between the first 3 baseline data points and last 3 treatment data points in the last advance notice phase. An example of *no effect* for problem behavior can be seen in the first application described by McCord et al. (2001). The mean of the first 3 baseline data points was 55%, indicating 55% of trials had severe problem behavior, and the mean of the final 3 data points in the last advance notice phase was 100% of trials, showing an increase in severe problem behavior.

However, the criterion of 80% or more reduction is not application to transition duration because transition durations are a function of both noncompliance and the physical distance between locations (i.e., 80-100% reductions are impossible because the participant needs to physically transition between locations). For this reason, for applications where transition duration was the primary measure, visual analysis was conducted to determine treatment effects. If a majority of data points in the intervention phase were lower than and did not overlap with a majority of data points in the baseline phase, we considered this a positive effect such that the

intervention meaningfully reduced transition time. The first application reported by Dettmer et al., (2000) provides an example of a positive effect on transition duration. In this application, 100% of the treatment data points were lower than and did not overlap with the data points in the baseline phase. A code of *no effect* was defined as no noticeable reductions in transition durations as determined by visual analysis. That is, if a majority of data points in the intervention phase were equal to or higher than or significantly overlapped with a majority of data points in the baseline phase, we coded this as no effect, such that the intervention did not meaningfully reduced transition time or perhaps even increased transition time. The first application reported by Jessel et al. (2016) provides an example of *no effect* for transition duration. In this application, data points during the baseline (advance notice) phase were higher than those in the treatment (unpredictable) phase for rich to lean transitions indicating that advance notice actually increased transition duration.

Inter-Rater Agreement

A primary coder, the first author, coded all 12 characteristics for each of the 28 applications that met inclusion criteria. A secondary coder (the second author) then independently coded all 12 characteristics for 100% of the applications. Inter-observer agreement (IOA) was defined as both coders providing the same code for each characteristic as described in Table 1. The primary coder and secondary coder met to review IOA for operational definitions after the secondary coder coded 6 applications (Cote et al., 2005; Dettmer et al., 2000; Dooley et al., 2001). At that point, 28 disagreements, out of the 72 characteristics coded, were identified and the primary and secondary coders discussed these and resolved these disagreements by revising the operational definitions for characteristics. These revised definitions were used to code the first 6 applications again (Cote et al., 2005; Dettmer et al.,

2000; Dooley et al., 2001) and then the remaining 22 applications. Both the original and the revised definitions are depicted in Table 1. Once the secondary coder completed the coding of all applications, IOA scores were calculated. That is, the overall IOA rates for each characteristic reflect all coding completed after the revised definitions were established. When disagreements arose, the coders met to resolve the disagreement, but this disagreement is still reflected in the IOA calculation. Below we describe each characteristic separately, along with the IOA for that characteristic and a description of any disagreements and how these were resolved for the purposes of coding each application (see Table 2).

Advance notice treatment effects. Overall IOA for coding advance notice treatment effects was 96%. The disagreement between the coders was whether the data depicted by Tustin (1995) constituted an 80% reduction in problem behavior. Exact percent reductions could not be calculated because it was difficult to clearly match the data point to the y-axis in the graph depicting the data. Because of this, the coders agreed to do a visual analysis; after reviewing the paper again, the coders agreed that a visual analysis showed a noticeable reduction in problem behavior and the application was coded as "positive effects."

Treatment location. Overall IOA for treatment location was 92%. During the coding of the first 6 applications, the coders identified two disagreements. The first disagreement regarded the first application in Dettmer et al., (2000). The second coder listed school and the primary coder listed home as the setting of the first application described in Dettmer et al., (2000). After reviewing the article, both coders agreed to code the application as home. The confusion arose because the intervention took place within an educational program, but this educational program was described as taking place in the participant's home.

The second disagreement occurred with an application that was coded after the revised definitions were used, and it was regarding whether the first application in Wilder et al., (2007) took place in the home as indicated by the secondary coder or in a classroom as indicated by the primary coder. After reviewing the article again, the primary coder identified his code as an error and both coders agreed that the setting clearly took place in the participant's home. However, this disagreement is still reflected in the IOA calculation.

Type of signal evaluated. Overall IOA for the type of signal evaluated was 93%. The coders disagreed on the type of signal evaluated in both applications described by Waters et al., (2009). The primary coder listed activity schedule and the secondary coder listed photographic priming. Although Waters et al. (2009) described their procedures as an activity schedule, after both coders reviewed the authors descriptions of their method, they both agreed that the procedures more closely matched the definition of photographic priming ("Materials included photographs with text for each activity", Waters et al., 2009, p. 310). However, this disagreement is still reflected in the IOA calculation.

Research design. Overall IOA for research design was 79%. The coders disagreed on all three applications described by Jessel et al., (2016), both applications described by Waters et al., (2009) and the second application described by McCord et al., (2001). The primary coder coded the applications in Jessel et al., (2016) as multielement while the secondary coder coded as multiple baselines. Following a careful re-reading of the paper and a discussion, the primary coder agreed that the research design was a multiple baseline. The confusion arose because different treatment settings were evaluated in a multielement design but the advance notice intervention was implemented in a multiple baseline. When reviewing Waters et al. (2009), the primary coder coded all of the applications as multiple baseline designs; whereas, the secondary

coder coded all of the applications as a combination of multiple baseline and ABC designs. Following discussion, the coders agreed Waters et al. (2009) used a multiple baseline and an ABC design in all applications. When reviewing McCord et al. (2001), the primary coder coded the second application as a multiple baseline design; whereas, the secondary coder coded it as a multiple baseline and reversal design. Following discussion, the coders agreed that a reversal and multiple baseline design was used in all applications. These disagreements are reflected in the overall IOA calculation.

Additional treatment components. Overall IOA for the inclusion of additional treatment components was 79%. The coders disagreed on the application described by Schmit et al., (2000), all three applications described by Schreibman et al., (2000), the application described in Tustin (1995), and the second application described by Wilder et al., (2006). The primary coder coded the application in Schmit et al., (2000) as including extinction because physical prompting was included in the baseline phase while the secondary coder coded as N/A. After carefully reviewing the article, the coders agreed to code the application as N/A because extinction was not described in the treatment phase. The secondary coder coded all three applications of Schreibman et al., (2000) as including differential reinforcement while the primary coder coded as N/A. After discussion, the coders agreed to code the applications as N/A because the reinforcers were delivered after watching the video priming procedure, not after the transition. The secondary coded the application in Tustin (1995) as N/A while the primary coder coded as including choice. Following discussion, the coders agreed to code this application as including choice because the researchers allowed the participant the opportunity to change activities after advance notice was delivered. The primary coder coded the second application in Wilder et al., (2006) as including extinction and differential reinforcement while the secondary

coder only included differential reinforcement. Following discussion, the secondary coder pointed out that while extinction was in place, the participant did not contact the extinction contingency. The coders agreed to code the application as differential reinforcement only. These disagreements are reflected in the overall IOA calculation.

Were the activities at the pre- and post- transition context kept constant? Overall IOA for whether the activities at the pre- and post-transition were kept constant was 82%. The coders disagreed on the application described in Study 2 by Flannery & Horner, (1994), all three applications described by Schreibman et al., (2000), and the application described by Vasquez et al., (2017). The primary coder coded the Flannery & Horner application as "yes" while the secondary coder coded the application as "no". After reviewing the article again, both coders agreed that the application should be coded as "no" because although the activities were kept consistent, they were not always presented in the same order. The secondary coder coded the applications in Schreibman et al., (2000) as "no" while the primary coder coded as "yes". After reviewing the article again, both coders agreed that the applications should be coded as "yes" because the participants transitioned between the same locations during each trial as shown in their respective priming videos. The secondary coder coded the application in Vasquez et al., (2017) as "yes" while the primary coder coded the application as "no". After reviewing the article again, the coders agreed to code the application as "no" because although only academic activities were included, it is not clear if the same activities were constant between trials. These disagreements are reflected in the overall IOA calculation.

Were reinforcer values of pre- and post- transition activities demonstrated through a preference assessment? Overall IOA for whether reinforcer values of pre- and post-transition contexts were evaluated in a preference assessment was 93%. The coders disagreed on both

applications in Waters et al., (2009). The primary coder coded the applications as "yes" while the secondary coder coded the application as "no". After reviewing the article, the coders agreed to code the applications as "no" because although a preference assessment was conducted, it was conducted to identify reinforcers, not rank the relative values of each transition context. These disagreements are reflected in the overall IOA calculation.

Were transitions categorized by rich to lean, lean to rich, or was the nature of the transition unclear? Overall IOA for the nature of the transition (i.e., transitioning from rich to lean, rich to rich reinforcement contexts) was 93%. The coders disagreed on both applications in McCord et al., (2001). The secondary coder coded the applications as "no" while the primary coder coded the applications as "yes". After reviewing the article again and discussing the nature of the transition, both coders agreed that the application should be coded as "yes", specifically rich to lean, because the participants were transitioning to a preferred context (stationary) to a less preferred one (physical movement). This disagreement is reflected in the overall IOA calculation.

Was advance notice evaluated as a single component treatment? Inter-rater agreement for whether advance notice was evaluated as a single component treatment was 86%. When comparing their codes for the first 6 applications, the coders disagreed on the first application in Dettmer et al., (2000) and the application in Dooley et al., (2001). The secondary coder coded Dettmer et al.'s (2000) first application as "yes" while the primary coder coded the application as "no". After reviewing the article again, both coders agreed that extinction was in place throughout the experimental arrangement and coded the application as "no". The primary coder coded the application in Dooley et al., (2001) as "no"; whereas, the secondary coder coded "yes". After reviewing the article again, both coders agreed that although advance notice was

initially evaluated with a differential reinforcement procedure, it was also assessed alone. The experimental design (i.e., ABC) of this application limits the conclusions we can draw from the use of advance notice alone, but advance notice was evaluated as a single component treatment.

Disagreements between the coders also occurred with the application in Schmit et al., (2000), and the application in Tustin (1995). In the application by Schmit et al.(2000), the primary coder coded this application as "no" while the secondary coder coded the application as "yes"; however, after reviewing the article again, both coders agreed that while extinction was in place during the baseline, it was not included in the treatment phase. Both coders agreed to code this application as "yes". In the application by Tustin (1995), the secondary coder coded the application as "yes" while the primary coder coded the application as "no". After reviewing the article again, both coders agreed that the treatment arrangement included a choice component; both coders agreed to code the application as "no". These disagreements are reflected in the overall IOA calculation.

Was a functional analysis conducted prior to treatment? Overall IOA for whether a functional analysis was conducted prior to treatment was 96%. The coders disagreed on the third application in Jessel et al., (2018). The primary coder coded the application as "yes" while the secondary coder coded the application as "no". After reviewing the article again, both coders agreed that while a functional analysis was conducted for the other two participants in the study, the third application did not conduct a functional analysis. The coders agreed to code the application as "no". This disagreement is reflected in the overall IOA calculation.

Was unpredictability demonstrated to be functionally related to problem behavior? Overall IOA for whether unpredictability was demonstrated to be functionally related to problem behavior was 100%.

CHAPTER 3: RESULTS

Summary of Results

Our search yielded 35 potential studies. From these, a total of 14 studies met inclusion criteria and were included in this review. From these 14 studies, a total of 28 applications were identified and coded based on the criteria described in the Method section and in Table 1. The codes for each characteristic for each of the 28 applications are listed in Table 2. Participant ages ranged from 14 months to 35 years and included typically developing individuals, individuals diagnosed with autism spectrum disorder or unspecified developmental disorders, and one participant diagnosed with fragile-x syndrome. Treatment contexts of applications included classroom or clinic settings (n = 20), the community (n = 2), home or residential settings (n = 5), and both home and community settings (n = 1).

A summary of the key findings is provided in Figure 1. Positive findings for the use of advance notice were reported in 10 applications, 8 measuring problem behavior and 2 measuring transition duration. The 8 applications measuring problem behavior (Dooley et al., 2001; Flannery & Horner, 1994, Schmit et al., 2000, Schreibman et al., 2000; Vasquez et al., 2017) showed a reduction of 80% or more from the first three points in baseline and the last three points in the last advance notice phase. The 2 applications assessing transition duration showed that 100% of the treatment phase data points were lower than and did not overlap with the data points in the baseline phase indicating that the advance notice reliably reduced transition duration (Dettmer et al., 2000).

Advance notice procedures took one of four different forms: visual activity schedule, verbal warning, photographic or video priming, and signaled visible activities. Four of the

applications used a visual activity schedule (Dettmer et al., 2000; Dooley et al., 2001; Flanner & Horner 1994;), 15 applications used verbal warnings (Cote et al., 2005; McCord et al., 2001; Tustin, 1995, Vasquez et al., 2017; Wilder et al., 2006; Wilder et al., 2007; Wilder et al., 2010), 6 used photographic or video priming (Schmit et al., 2000; Schreibmen et al., 2000; Waters et al., 2009), and 3 used signaled visible activities (Jessel et al., 2016). Most studies used a reversal experimental design (Cote et al., 2005; Dettmer et al., 2000; Dooley et al., 2001; Flannery & Horner 1994; McCord et al., 2001; Tustin 1995; Wilder et al., 2006; Wilder et al., 2007; Wilder et al., 2010; Vasquez et al., 2017), followed by a multiple baseline design (Jessel et al., 2016; McCord et al., 2001;Schmit et al., 2000; Schreibman et al., 2000; Waters et al., 2009), multielement design (Cote et al., 2005), and an ABC experimental design (Dooley et al., 2001; Waters et al., 2009). Additional treatment components included extinction (Cote et al., 2005; Dettmer et al., 2000; McCord et al., 2001; Waters et al., 2009; Wilder et al., 2006; Wilder et al., 2007; Wilder et al., 2010) differential reinforcement (Dooley et al., 2001; McCord et al., 2001; Waters et al., 2009; Wilder et al., 2006), choice (Tustin, 1995; Vasquez et al., 2017), noncontingent reinforcement (Cote et al., 2005; Wilder et al., 2007), and high probability sequencing (Wilder et al., 2007).

Among the 10 applications that demonstrated positive effects (Dettmer et al., 2000; Dooley et al., 2001; Flannery & Horner 1994; Schmit et al., 2000; Schreibman et al., 2000; Tustin 1995; Vasquez et al., 2017), only 3 kept the pre- and post-transitions constant (Schreibman et al., 2000); in the other 7, it was unclear if the pre- and post-transition contexts were held constant (Dettmer et al., 2000; Dooley et al., 2001; Flannery & Horner 1994; Schmit et al., 2000; Tustin 1995; Vasquez et al., 2017). Conversely, in the 18 applications reporting no effect (Cote et al., 2005; Jessel et al., 2016; McCord et al., 2001; Waters et al., 2009; Wilder et

al., 2006; Wilder et al., 2007; Wilder et al., 2010), all kept the pre- and post-transition contexts constant. Furthermore, among these same 10 applications that reported positive findings, none evaluated the relative reinforcing value for the pre- and post-transition activities. However, 13 of the 18 applications reporting no effect did evaluate the relative reinforcing value for the pre- and post-transition activities through the use of preference assessment (i.e., multiple stimulus without replacement, paired stimulus; Jessel et al., 2016; McCord et al., 2001; Wilder et al., 2006; Wilder et al., 2007; Wilder et al., 2010). In these 13 applications, the reinforcing value of the pre- and post-transition context was experientially evaluated and problem behavior was often demonstrated to be functionally related to continued access to pre-transition activities and escape from post transition activities. These applications all demonstrated transition condition where changes from richer reinforcement contexts to leaner reinforcement contexts were likely to increase problem behavior or transition duration.

Among the 10 applications that demonstrated positive effects, only 6 evaluated the effects of the advance notice intervention as a single component treatment (Dooley et al., 2001; Flannery & Horner, 1994; Schmit; et al., 2000; Schreibman et al., 2000). Conversely, all 18 applications that showed no treatment effect evaluated the effects of the advance notice treatment as a single component treatment.

Among all 28 applications, 12 conducted a functional analysis (FA) prior to implementing an advance notice procedure (Jessel et al., 2016; McCord et al., 2001; Waters et al., 2009; Wilder et al., 2006; Wilder et al., 2007; Vasquez et al., 2017). The results of these analyses identified transition arrangements that evoked problem behavior related to the relative changes in reinforcement value between the pre- and post- transition activity and unrelated to predictability. One application (Flannery & Horner, 1994) reported problem behavior to be

functionally related to unpredictability, demonstrated through a treatment analysis, not a pre-intervention functional analysis.

CHAPTER 4: DISCUSSION

Taken together, these findings indicate that when functional analyses are conducted for transition-related problem behavior, problem behavior is often not a function of unpredictability (Figure 1). Notably, only 1 application (i.e., Flannery & Horner, 1994) out of 28 applications of advance notice showed a functional relationship between unpredictability and transition-related problem behavior, and this was the only application to demonstrate the use of advance notice as a function-based treatment. More specifically, problem behavior was more likely to occur when participants transition from preferred environment to non-preferred in 11 out of 12 applications (Jessel et al., 2016; McCord et al., 2001; Waters et al., 2009; Wilder et al., 2006; Wilder et al., 2007). The application in Vasquez et al., (2017) demonstrated that problem behavior was maintained by escape from task interruptions. These findings suggest that problem behavior is generally not a function of unpredictability, but rather is related to the qualitative changes in reinforcement that occur during transitions. For this reason, when the relative reinforcing value of pre- and post-transition contexts are not identified, conclusions regarding treatments applied to transitions cannot be made. Although reductions in problem behavior were seen in 10 applications that used advance notice, in these applications the relative reinforcing values of the pre- and post-transition contexts were not identified (see Figure 1). We examine these applications below and discuss plausible alternative explanations for these findings.

Explanations for Positive Results Other Than Advance Notice

Observed improvements in transition-related problem behavior may be due to variables other than advance notice. We found two general categories of confounds in our review of this literature. The first category involves the inclusion of additional treatment components and a

failure to evaluate the effects of advance notice in isolation from other components. The second category involves a failure to evaluate the relative reinforcing value of the pre- and post-transition contexts and to keep transition types constant across baseline and treatment phases.

Isolating the Effects of Advance Notice

Only 4 of the 10 applications that showed a positive effect for advance notice used advance notice in isolation, that is, they included additional independent variables (Dettmer et al., 2000; Tustin, 1995; Vasquez et al., 2017) or did not hold variables constant between phases (Dooley et al., 2001). Combining advance notice with additional treatment components such as extinction, differential reinforcement (which also includes extinction), and choice prevent us from drawing conclusions about the functional relation between unpredictability and problem behavior. For example, in 2 applications (Dettmer et al., 2000), extinction was included in all phases, including the advance notice phase; advance notice combined with extinction reduced problem behavior; however, advance notice was not evaluated as a stand-alone procedure. Dooley et al. (2001) provides another example of combining advance notice with other interventions. In one of their applications, they evaluated the effects of a PECS-based schedule board in combination with a differential reinforcement protocol. The multi-component treatment resulted in an overall decrease in disruptive behaviors and an increase in compliance. Vasquez et al. (2017) and Tustin (1995) evaluated advanced notice as a 2-minute verbal warning indicating a change in activities in which the participant could independently choose when to switch to the next activity at any time during the 2 minutes between the verbal warning and the scheduled activity change. Choice, more specifically the opportunity to choose, has been demonstrated to be reinforcing even when the choice does not directly alter consequences (Tiger et al., 2006).

In summary, positive findings for advance notice interventions are confounded by the frequent use of advance notice combined with additional treatment components such as differential reinforcement (Dooley et al., 2001), extinction procedures (Dettmer et al., 2000), or inclusion of choice procedures (Vasquez et al., 2017). Inclusion of additional intervention procedures without further component analyses limit what treatment effects can be attributed to manipulations of predictability alone, and limit any conclusions about the efficacy of advance notice as a treatment for transition-related problem behavior. When researchers do isolate the effects of advance notice, advance notice alone generally fails to produce meaningful behavior change. That is, when additional treatment components (i.e., extinction, differential reinforcement, choice) are not included, advance notice alone fails to reduce problem behavior. For example, in 4 applications when problem behavior terminated the demand to transition, the use of advance notice procedures alone did not reduce levels of problem behavior; problem behavior decreased only when differential reinforcement and extinction procedures were also used (McCord et al., 2001; Waters et al., 2009). Additionally, the differential reinforcement and extinction continued to remain efficacious even when the visual schedule was removed.

Pre- and Post- Transition Reinforcement Contexts

A second plausible explanation for the positive findings of advance notice when problem behavior is not functionally related to unpredictability is that the pre- and post-transition activities were not held constant, resulting in qualitative changes between transitions during baseline and treatment. This could happen if the researchers failed to properly keep constant the pre- and post-transition context reinforcement values. Positive results may be found if transitions during baseline involved changes from rich reinforcement contexts to lean and transitions during the treatment phases involved changes from lean reinforcement contexts to

rich. In all 10 applications demonstrating positive findings, none reported nor evaluated the effects of the reinforcing value of the pre- and post- transition activity on responding. For example, Dettmer et al. (2000) and Schmit et al. (2000) identified transitions between locations that evoked problem behavior; however, it is unclear whether they kept the pre- and post-transition activities constant at each location. In one application (Schmit et al., 2000), transitions from outside to inside the classroom varied based on weather conditions (the participant was more resistant to transitioning indoors on days with good weather) suggesting that qualitative differences in pre- and post-transition activities played a role in how the participant responded to advance notice (i.e., instructions to transition). Basic researchers have evaluated this question extensively.

Basic researchers study transitions by examining the relative reinforcing value of pre- and post- transitional contexts which includes but is not limited to changes in schedules of reinforcement (Everly et al., 2014; Perone & Courtney, 1992), changes in response requirements to receive reinforcement (Wade-Galuska et al., 2005), and changes in reinforcer magnitude delivered following a response (Bejarano et al., 2003). When unpredictability itself is isolated as a relevant factor in transitions, unpredictable arrangements result in decrease pausing in both basic and applied research (Everly et al., 2014; Jessel et al., 2016; Perone & Courtney, 1992; Retzlaff et al., 2017, Williams et al., 2011) when compared to transitions to relatively leaner schedules of reinforcement. For example, Perone and Courtney (1992) showed that stimuli associated with leaner schedules of reinforcement increased pausing in pigeons. In the mixed schedule arrangement, pausing was controlled by the previous reinforcer magnitude, and pauses increased following the delivery of larger reinforcers. However, in the multiple schedule arrangement when the upcoming schedule of reinforcement was signaled (i.e., predictable

transitions), pausing was controlled by both the past reinforcer magnitude as well as the upcoming reinforcer magnitude. Two main effects were seen when the pigeons experienced the multiple schedule arrangement. While pausing towards large reinforcement schedules decreased, pausing increased towards smaller reinforcement schedules. The transition from large to small reinforcement schedules resulted in the longest pause duration.

In their translational study, Jessel et al. (2016) examined transition-related pauses among children diagnosed with an autism spectrum disorder. They showed that the type of transition, in particular the relative reinforcing value of the pre-transition activity and the post-transition activity, played a significant role in the transition duration and occurrence of pausing. Moreover, the presence of visual cues actually lengthened the pausing. Jessel et al. (2016) then conducted a functional analysis of each child's pausing in which the children transitioned between rich to lean, lean to lean, rich to rich, and lean to rich contexts; the upcoming activity was visible in all contexts. Overall, transition duration (i.e., pausing) was longer during transitions away from rich reinforcing contexts towards lean reinforcing contexts. Jessel et al. (2016) then introduced a treatment of probabilistic reinforcement that removed the signals associated with the upcoming transition activity, thereby making the transition demands unpredictable. This treatment reduced the pausing associated with rich to lean transitions for all participants. Finally, using a concurrent-chains analysis, the authors found that treatment (i.e., unpredictable transition) was preferred to rich and lean transitions for one participant. Jessel et al.'s (2016) findings were consistent with findings from basic research in which schedule-correlated stimuli have been shown to be both aversive and to result in an increase in pausing during transitions from rich to lean contexts (Everly et al., 2014; Perone & Courtney, 1992). For example, Everly et al. (2014) showed that stimulus correlated with lean schedules can become aversive as demonstrated by an

escape response, whereby pigeons were more likely to peck a key to escape the lean-schedule stimulus than the rich one. Taken together, these finding raise questions about both the efficacy of and the preference for schedule-signaling stimuli, such as visual schedules, that aim to increase the predictability of the post-transition context.

In summary, if the pre- and post-transition activities are not held constant, conclusions about interventions for transitions cannot be made. Findings from basic and applied research clearly show that evaluations of pre- and post- transition context are important because they may identify the functional relation between transition-related problem behavior and specific types of transitions. For example, when functional analyses have been conducted in transition contexts, problem behavior is often related to the relative reinforcing value of pre- and post- transition contexts. Escape from upcoming non-preferred activities and continued access to pre-transition preferred activities (Waters et al., 2009; Wilder et al., 2006) are often the maintaining variables and have all been identified as functionally related to problem behavior during transitions.

Whenever problem behavior is functionally related to variables other than predictability, advance notice procedures fail to produce meaningful behavioral outcomes (McCord et al., 2001; Waters et al., 2009; Wilder 2006). For example, Waters et al. (2009) conducted a functional analysis on transition-related problem behavior for two individuals. During the analysis, transitions were terminated contingent on problem behavior during the trial. For both participants, problem behavior occurred when transitioning from a no-activity condition to a non-preferred activity and when transitioning away from a preferred activity to a no-activity condition. Problem behavior, however, did not occur when transitioning from a no-activity condition to a preferred activity. For both of these individuals, problem behavior during transitions was maintained by both access to preferred pre-transition activities and escape from

non-preferred post-transition activities. As described above, advance notice was inefficacious at reducing problem behavior for all participants. When the contingency that is maintaining problem behavior is unrelated to the pre- and post-transition activities, such as escape from the physical demand of transitions (McCord et al., 2001), advance notice is inefficacious at reducing problem behavior. This is not surprising, however, if the advance notice procedures did not address the function of problem behavior. Relatedly, findings from basic research tell us that, under certain conditions, advance notice such as visual cues can worsen transition-related problem behavior (Everly et al., 2014; Jessel et al., 2016; Langford et al. 2019; Perone & Courtney 1992).

CHAPTER 5: FUTURE RESEARCH

Taken together, results from these studies suggest that the addition of advance notice to other procedures may not result in a significant reduction in problem behavior. However, additional component analyses can help determine if advance notice may enhance, have no effect on, or possibly worsen other treatments, which may further help practitioners in the selection of treatment components. When the use of advance notice does not worsen the effects of treatment, it might be a useful addition to other procedures, increasing the social validity and overall effectiveness of the treatment package (Baer et al., 1987). Given how commonly advance notice is used in typical environments (Hume et al., 2014), and parents' affinity for this procedure (Robertson et al., 2016), further investigating the conditions under which its use may be beneficial is important.

In addition, the extent to which recipients of this treatment prefer the use of advance notice procedures needs to be evaluated. For example, Jessel et al., (2016) found that one of their participants preferred to transition towards a station that contained a 50/50 chance of highly preferred activities over a station that always contained highly preferred activities. While preference for unpredictability has been demonstrated in basic research (Everly et al., 2014), no other applied research has evaluated preference for predictable or unpredictable transition arrangements. More research is needed to translate the findings of basic research to identify under what conditions unpredictability may be preferred.

Finally, findings from basic and translational research suggest that, depending on the context, signals may worsen transitions (Jessel et al., 2016; Perone & Courtney, 1994). Not only is this important to consider because the inclusion of advance notice may worsen transition-

related problem behavior, but this also points to other uses for advance notice. For example, when transition demands involve a relative decrease in reinforcement (i.e., rich to lean), the use of unpredictability may be warranted. While the probabilistic reinforcement arrangement described by Jessel et al., (2016) provided some preliminary evidence for a treatment utilizing unpredictability that can reduce transition duration and non-compliance, this treatment has yet to be evaluated in the context of more severe topographies of problem behavior such as self-injury or aggression. Furthermore, a schedule thinning component and additional preference assessments may be warranted to further increase the efficacy of and social validity of probabilistic reinforcement. For example, will treatment effects demonstrated by the probabilistic reinforcement procedure described Jessel et al., (2016) still maintain when the unpredictable condition contains a 25% chance of a rich reinforcement condition rather than 50%?

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

Current research does not support advance notice as a universally efficacious procedure to reduce problem behavior during transitions. This makes sense because more often than not, when such evaluations are conducted (11 of 28), transitions that evoke problem behavior involve transitions from rich to lean reinforcement contexts (Jessel et al., 2016; McCord et al., 2001; Waters et al., 2009; Wilder et al., 2006; Wilder et al., 2007). Basic research tells us that signaling transitions where the upcoming activity is non-preferred may actually worsen problem behavior. Our review of the research indicates that making upcoming transition contexts predictable may have one of two effects: if the upcoming activity is highly preferred or of a rich reinforcement schedule, transition duration and problem behavior may decrease; if the upcoming activity is non-preferred or of a lean reinforcement schedule, transition duration or problem behavior may increase. These findings suggest that advance notice may be beneficial if upcoming transition contexts are highly reinforcing.

As previously discussed, conducting functional analyses are best practice when developing treatment plans for problem behavior (Ingram et al., 2005). The same technology should and can be applied to transition-related problem behavior. Functional analyses are vital to understanding the variables that contribute to transition-related problem behavior. Although we have one example of an application in which a treatment analysis demonstrated the functional role of unpredictability in evoking problem behavior (Flannery & Horner, 1994), and thereby the use of an advance notice reducing these problems, it is a risky option as advance notice may also worsen the problem if escape from the post-transition activity is the maintaining variable. Therefore, in line with best practice for treating other forms of problem behavior, gaining an

understanding of the variables maintaining transition-related problem behavior through the use of functional analysis is recommended. Examples of this procedure as applied to transition-related problem behavior can be found in Castillo et al., (2018), McCord et al., (2001), or Wilder et al., (2006). In the context of transition-related problem behavior, functional analyses can identify under what conditions transitions are likely to evoke problem behavior. If unpredictability is determined to be the function, advance notice is warranted; however, if transition context, escape, or other conditions are identified as functionally related to problem behavior, other function-based treatments ought to be used.

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Table 1
Operational Definitions of the Characteristics Coded for Each Advance Notice Application

Coding Characteristic	Original Definition	Revised Definition
Participant Characteristics	Participant gender, age (in years), and reported diagnoses	No changes
Advance Notice Treatment Effects	**Positive effects** are defined as a decrease in problem behavior by 80% or more between the first 3 data points in baseline and the last 3 data points in treatment or a reduction in transition duration as determined by visual analysis where advance notice was evaluated. **No effects** are defined as a decrease in problem behavior by less than 80% between the first 3 data points in baseline and the last 3 data points in treatment or no decrease in transition duration as determined by visual analysis where advance notice was evaluated.	Treatment effects compare only the baseline and advance notice phase of treatment. Treatment effects of additional treatment components are not evaluated. **Positive effects** are defined as an average decrease in problem behavior by 80% or more between the first 3 data points in baseline and the last 3 data points in treatment or a reduction in transition duration as determined by visual analysis. **No effects** are defined as a decrease in problem behavior by less than 80% between the first 3 data points in baseline and the last 3 data points in treatment or no decrease in transition duration as determined by visual analysis where advance notice was evaluated.
Treatment Location	Settings where the advance notice intervention was implemented: **Home/residential center, community, classroom, university clinic**	Settings where the advance notice intervention was implemented: **Home/residential center, community, classroom/clinic setting**
Type of Signal Evaluated	Type of advance notice procedure implemented: **Verbal warning, activity schedule, photographic/video priming, signaled visible activities**	Type of advance notice procedure implemented: **Verbal Warning**: Any procedure where advance notice of an upcoming transition is provided verbally prior to initiating the transition (e.g., “in two minutes, we are going to transition”) **Activity Schedule:** Any procedure where a visual sequence of activities is presented prior to initiating a transition.

(Table 1 Continued)

		Photographic/Video Priming: Any procedure where a photograph or video of an upcoming activity is presented prior to initiating a transition. **Signaled Visible Activities:** Any procedure where upcoming activities are visible and signaled by programmed discriminative stimuli.
Research Design	Single-subject experimental design researchers used to demonstrate treatment effects. Examples included **ABC, reversal, multiple baseline, multielement,** or a **combination.**	No changes
Additional Treatment Components	Treatment components that were evaluated concurrently or separately from the advance notice procedure: **Extinction**: Any procedure where problem behavior does not terminate the transition demand and the participant is physically guided to the post transition activity (e.g., physical guidance, three-step prompting) **Noncontingent reinforcement**: Any procedure where highly preferred items are provided to the participant noncontingently during the transition **Differential reinforcement**: Any procedure where compliance to the instruction demand is reinforced **Choice**: Any procedure that included an opportunity for the participant to choose when or what to transition to High probability sequencing: Any procedure where a sequence of high probability instructions were presented immediately prior to the instruction to transition.	No changes

(Table 1 Continued)

Were the activities at the pre- and post-transition context kept constant?	**Yes**: Experimenters reported keeping the pre and post transition activities constant **Unclear**: Experimenters did not report keeping the pre and post transition activities constant. Participants transitioned from constant locations but it is unclear if the activities at each location was held constant. **No**: The experimenters did not keep the pre and post transition activities constant. The experimenters reported randomizing what activities the participant transitioned to or from.	**Yes:** The pre-transition activity remained constant throughout each transition trial and the post-transition activity remained constant throughout each transition trial. (i.e., if the transition context involved a transition from play to work, every trial consisted of the same play context and the same work context. **No:** The experimenters did not keep the pre-transition activities constant and the post-transition activities constant, or participants transitioned from constant locations but it is unclear if the activities at each location were held constant, or the experimenters reported randomizing the activities the participant transitioned to or from.
Were reinforcer values of pre and post transition activities demonstrated?	**Yes**: Reinforcer values of pre and post transition activities were demonstrated through preference assessments. **No**: Reinforcer values of pre and post transition activities were not demonstrated through preference assessments.	No changes
Were transitions categorized as lean to rich, rich to lean, or unclear?	**Rich to Lean**: The participant transitioned from relatively rich reinforcing contexts to a leaner context as determined by a preference assessment. **Lean to Rich**: The participant transitioned from relatively lean reinforcing contexts to a richer context as determined by a preference assessment. **Unclear**: The nature of the transition contexts were not reported nor evaluated by a preference assessment.	**Yes: Rich to Lean:** the participant transitioned from relatively rich reinforcement contexts to a leaner or aversive context as determined by a preference assessment. **Yes: Lean to Rich:** the participant transitioned from relatively lean reinforcing contexts or aversive contexts to a richer context as determined by a preference assessment **No/unclear:** A preference assessment was not conducted so the reinforcing nature of the pre- and post- transition contexts could not be evaluated.

(Table 1 Continued)

Was advance notice evaluated as a single component treatment?	**Yes**: Advance notice was implemented as a single component treatment.	**Yes:** Advance notice was implemented without the use of additional treatment components.
	No: Advance notice was not implemented as a single component treatment.	**No:** Advance notice was with additional treatment components (e.g., differential reinforcement, extinction, noncontingent reinforcement).
Was a functional analysis conducted prior to treatment?	**Yes**: A functional analysis was conducted prior to the implementation of advance notice procedures.	No changes
	No: A functional analysis was not conducted prior to the implementation of advance notice procedures.	
Was unpredictability demonstrated to be functionally related to problem behavior?	**Yes**: Unpredictability was demonstrated to be functionally related to problem behavior through the use of functional analyses or treatment analyses.	No changes
	No: Unpredictability was not demonstrated to be functionally related to problem behavior.	

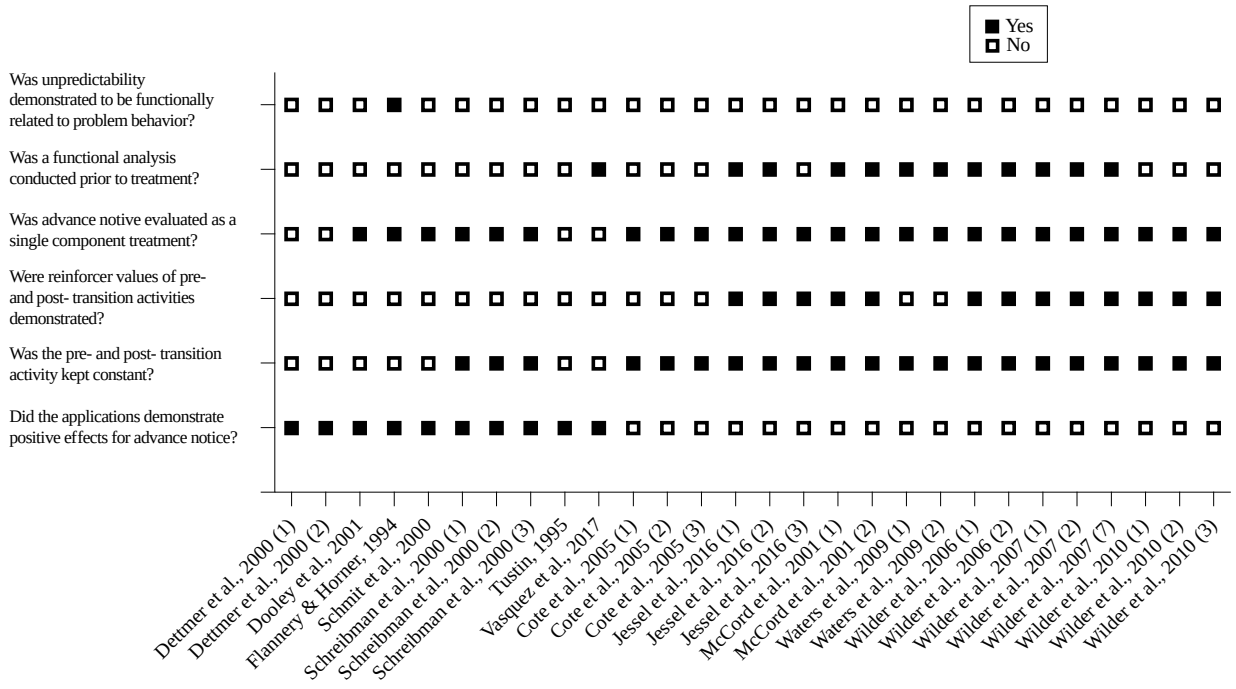

Figure 1. Applications of advance notice meeting (black boxes) or not meeting (white box) each criterion for demonstration of efficacy.

Note. Studies are listed first by whether they showed positive effects or no effects and then in alphabetical order along the x-axis. Numbers in the parentheses denote each application of advance notice within a study (See Table 2). Each application of advance notice is scored as Yes (black boxes) or No (white boxes) based on the questions located on the y-axis.

Table 2

Summary of the Coded Characteristics for Each Advance Notice Application

Reference	Participants Age, Gender, and Diagnosis	Treatment Effects	Treatment Location	Type of signal evaluated	Research Design	Additional Treatment Components	Was the pre- and post-transition context kept constant?	Were reinforcer values of pre- and post-transition activities evaluated through a preference assessment?	Were transitions evaluated categorized as lean to rich, rich to lean, or unclear?	Was advance notice evaluated as a single component treatment?	Was a functional analysis conducted prior to treatment?	Was unpredictability demonstrated to be functionally related to problem behavior?
Dettmer et al., 2000 (1)	Jeff, Male, 7y, ASD	Positive Effects	Community	Activity Schedule	Reversal	EXT	No	No	No	No	No	No
Dettmer et al., 2000 (2)	Josh, Male, 5y, ASD	Positive Effects	Home	Activity Schedule	Reversal	EXT	No	No	No	No	No	No
Dooley et al., 2001	Chris, Male, 3y, PDD	Positive Effects	Classroom	Activity Schedule	ABC Design	DRA	No	No	No	Yes	No	No
Flannery et al., 1994 (Study 2)	Aviv, Male, 17m, ASD, ACP	Positive Effects	Classroom	Activity Schedule + Timer	Reversal	N/A	No	No	No	Yes	No	Yes
Schmit et al., 2000	Alex, Male, 6y, ASD	Positive Effects	Classroom	Photographic Priming	Multiple Baseline	N/A	No	No	No	Yes	No	No
Schreibman et al., 2000 (1)	Andrew, Male, 3y, ASD	Positive Effects	Home	Video Priming	Multiple Baseline	N/A	Yes	No	No	Yes	No	No
Schreibman et al., 2000 (2)	Lee, Male, 3y, ASD	Positive Effects	Community	Video Priming	Multiple Baseline	N/A	Yes	No	No	Yes	No	No
Schreibman et al., 2000 (3)	Nathan, Male, 6y, ASD	Positive Effects	Home, Community	Video Priming	Multiple Baseline	N/A	Yes	No	No	Yes	No	No
Tustin, 1995	Stan, Male, 28y, ASD, MR	Positive Effects	Classroom	Verbal Warning	Reversal	Choice	No	No	No	No	No	No
Vasquez et al., 2017	Mary, Female, 7y, ASD	Positive Effects	Home	Verbal Warning	Reversal	Choice	No	No	No	No	Yes	No
Cote et al., 2005 (1)	Sammy, Male, 14m, Typical	No Effect	Classroom	Verbal Warning	Multielement, Reversal	NCR, EXT	Yes	No	No	Yes	No	No

(Table 2 Continued)

Cote et al., 2005 (2)	Mackenzie, Male, 22m, Typical	No Effect	Classroom	Verbal Warning	Multielement, Reversal	NCR, EXT	Yes	No	No	Yes	No	No
Cote et al., 2005 (3)	Stephanie, Female, 15m, Typical	No Effect	Classroom	Verbal Warning	Multielement, Reversal	NCR, EXT	Yes	No	No	Yes	No	No
Jessel et al., 2016 (1)	Franco, Male, 4y, ASD	No Effect	University Clinic	Signaled Visible Activities	Multiple Baseline	N/A	Yes	Yes	Yes: Both	Yes	Yes	No
Jessel et al., 2016 (2)	Jonah, Male, 3y, ASD	No Effect	University Clinic	Signaled Visible Activities	Multiple Baseline	N/A	Yes	Yes	Yes: Both	Yes	Yes	No
Jessel et al., 2016 (3)	Ian, Male, 6y, ASD	No Effect	University Clinic	Signaled Visible Activities	Multiple Baseline	N/A	Yes	Yes	Yes: Both	Yes	No	No
McCord et al., 2001 (1)	Hayden, Male, 27y, MR	No Effect	Residential Center	Verbal Warning	Reversal	DRA, EXT	Yes	Yes	Yes: Rich to Lean	Yes	Yes	No
McCord et al., 2001 (2)	Michael, Male, 39y, MR	No Effect	Residential Center	Verbal Warning	Multiple Baseline	DRA, EXT	Yes	Yes	Yes: Rich to Lean	Yes	Yes	No
Waters et al., 2009 (1)	Jimmy, Male, 6y, ASD	No Effect	Classroom	Photographic Priming	Multiple Baseline + ABC	DRO, EXT	Yes	No	Yes: Rich to Lean	Yes	Yes	No
Waters et al., 2009 (2)	Vern, Male, 6y, ASD	No Effect	Classroom	Photographic Priming	Multiple Baseline + ABC	DRO, EXT	Yes	No	Yes: Rich to Lean	Yes	Yes	No
Wilder et al., 2006 (1)	Amy, Female, 35m, Typical	No Effect	University Clinic	Verbal Warning	Reversal	DRO, EXT	Yes	Yes	Yes: Rich to Lean	Yes	Yes	No
Wilder et al., 2006 (2)	Don, Male, 40m, Typical	No Effect	University Clinic	Verbal Warning	Reversal	DRO	Yes	Yes	Yes: Rich to Lean	Yes	Yes	No
Wilder et al., 2007 (1)	Eddie, Male, 3y, Typical	No Effect	Home	Verbal Warning	Reversal	NCR, HPS, EXT	Yes	Yes	Yes: Rich to Lean	Yes	Yes	No
Wilder et al., 2007 (2)	Ricky, Male, 2y, Typical	No Effect	Classroom	Verbal Warning	Reversal	NCR, HPS, EXT	Yes	Yes	Yes: Rich to Lean	Yes	Yes	No

(Table 2 Continued)

Wilder et al., 2007 (3)	Timmy, Male, 3y, Fragile-X	No Effect	Classroom	Verbal Warning	Reversal	NCR, HPS, EXT	Yes	Yes	Yes: Rich to Lean	Yes	Yes	No
Wilder et al., 2010 (1)	Ralph, Male, 5y, Typical	No Effect	Classroom	Verbal Warning	Reversal	EXT	Yes	Yes	Yes: Rich to Lean	Yes	No	No
Wilder et al., 2010 (2)	Chris, Male, 4y, Typical	No Effect	Classroom	Verbal Warning	Reversal	EXT	Yes	Yes	Yes: Rich to Lean	Yes	No	No
Wilder et al., 2010 (3)	Sam, Male, 4y, Typical	No Effect	Classroom	Verbal Warning	Reversal	EXT	Yes	Yes	Yes: Rich to Lean	Yes	No	No