

Antecedent Strategies to Promote Children’s and Adolescents’ Compliance with Adult Requests: A Review of the Literature

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Abstract Compliance with adult requests and directives has often been described as a keystone behavior in children, meaning it is associated with engagement in other desirable and socially appropriate behaviors. As such, a great deal of research has been directed toward identifying strategies that increase compliance in children. Antecedent strategies, which focus on increasing the probability of compliance prior to or during the delivery of the directive or request, are popular because they have the potential to prevent noncompliance; however, it is not clear which of the numerous antecedent strategies are effective or for whom. Therefore, a systematic review of the antecedent strategies for compliance was completed. Forty-two studies were identified evaluating eight different antecedent strategies for children aged 1–19. It was determined that high-probability command sequences, effective instruction delivery, and errorless compliance training may all be considered evidence-based antecedent strategies to increase children’s compliance with adult requests.

Keywords Antecedent · Compliance · Children · Adolescents

Introduction

Noncompliance is one of the most frequent reasons parents seek psychological services regarding their children (McMahon and Forehand 2005), and it is frequently cited

as one of the most common referral concerns in schools (Skiba et al. 1997). Due to this, child compliance with adult requests is a frequent target for behavioral interventions (McMahon and Forehand 2003). Compliance is defined as a child’s immediate acceptance and execution of an adult-delivered instruction to engage in a specific behavior. Noncompliance, then, is the lack of such action and can take many forms such as screaming, crying, myriad other disruptive behaviors or simple inaction. Although increases in compliance and reductions in noncompliance have been targeted in the behavioral intervention literature, an emphasis on increasing prosocial, appropriate behaviors within this literature base (Carr et al. 2002) supports the use of the former definition. This is especially important considering that decreasing noncompliance does not necessarily ensure an increase in compliance, depending on how noncompliance is defined. That is, demonstrating a reduction in one negative behavior exhibited in response to an adult-delivered request (e.g., crying) does not guarantee an increase in compliance.

Compliance is commonly regarded as a “keystone” behavior in children (Ducharme and Shecter 2011). Keystone behaviors are those that, when exhibited, promote engagement in other prosocial or appropriate behaviors. A more thorough description of the theory behind keystone behaviors has been provided elsewhere (Barnett et al. 1996); however, an example is provided to illustrate the point. Consider a child who is compliant with all adult directives, but, upon entering Kindergarten, engages in disruptive behavior in the form of speaking without raising his hand. During the first day of school, the teacher observes this behavior and instructs the student to raise his hand before speaking. Because the child is compliant, he accepts the instruction and raises his hand in the future when he wants to speak. Keystone behaviors, like

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compliance with adult requests, make excellent intervention targets because they enable individuals to adapt to their environment by providing them with the behavioral skills necessary to acquire and engage in other socially appropriate behaviors.

Types of Compliance

When conceptualizing and reviewing compliance, it is important to make the distinction between several different forms of compliant behavior. Schaffer and Crook (1980) identified three different types of compliance: orientation, contact, and task. Orientation compliance was described as a child directing his or her visual attention toward a stimulus after being given a request to do so by an adult (e.g., “Look at the book”). Contact compliance was described as a child making physical contact with a stimulus after being directed to do so by an adult (e.g., “Play with your blocks”). Finally, task compliance was described as a child accurately completing a specific task or activity after being directed to do so by an adult (e.g., “Put the toy in the box”). Schaffer and Crook (1980) found that the lowest rates of compliance in their sample were observed when task compliance was expected. This finding is not surprising when considering that the response effort involved in complying with task demands will likely be higher compared to orientation or contact demands.

Further examining task compliance reveals another distinction that has received little empirical attention. Forehand (1977) initially addressed the issue of whether a task demand is immediately acted upon (i.e., initiation compliance) and whether it is eventually completed (i.e., completion compliance). Given any multi-step task (e.g., “pick up your toys”, “eat your dinner”), a child may initially comply by beginning the task but may fail to complete the entire task. For example, following an adult’s request to “clean up your toys,” an initially compliant child may say “Ok,” pick up one or two errant toys, place them in a toy box, and stop cleaning to engage in a more preferred activity. In this case, it would be appropriate to describe the child’s behavior using the term initiation compliance because he did begin cleaning; however, the term completion compliance would not be appropriate because the task was not finished. The extent to which these two forms of task compliance are discussed in the literature is unknown; however, this distinction is important as children grow older and are expected to engage in more complex, multi-step behaviors that require self-management.

Strategies to Promote Compliance

Interventions addressing child noncompliance typically rely on strategies rooted in behavior analysis. Some of the

most well-researched treatments, such as parent–child interaction therapy (PCIT, Eisenstadt et al. 1993) and behaviorally based parent training (e.g., Forehand et al. 1979), combine multiple components and involve teaching parents to implement a combination of behavioral strategies such as contingent praise and time-out, antecedent strategies such as rule-setting and modification of instruction delivery, and extinction procedures such as planned ignoring. Although there are no experimental component analyses of either treatment package, there is a wealth of literature support the use of many of the components as stand-alone interventions.

Consequence strategies, which apply environmental modifications following the occurrence of compliance or noncompliance, are generally effective. For example, Scarboro and Forehand (1975) demonstrated that two forms of time-out, applied contingently following instances of noncompliance, were effective in decreasing oppositional behavior and increasing compliance over a no-treatment control group. Bean and Roberts (1981) compared a combination of contingent time-out with and without corporal punishment to a no-treatment control group and obtained similar results. In a meta-analysis by Gershoff (2002), immediate compliance was identified as the only positive outcome associated with corporal punishment. Additionally, a systematic review of consequence interventions to address noncompliance by Owen et al. (2012) identified verbal reprimands and negative nonverbal responses (e.g., time-out) as most effective with mixed evidence for compliance–contingent praise and other positive nonverbal responses.

In contrast, antecedent strategies refer to a broad class of behavioral interventions that involve modifications of environmental stimuli prior to the occurrence of a target behavior (Cooper et al. 2007). These strategies, such as modification of instruction delivery (e.g., Matheson and Shriver 2005), are valued because of their temporal relation to the target behavior. That is, because antecedent strategies are implemented prior to the occurrence of the target behavior (e.g., noncompliance), an effective strategy has the potential to prevent the target behavior from ever occurring (Kern and Clemens 2007). This quality may make antecedent strategies more acceptable (i.e., socially valid; Wolf 1978) to treatment agents (e.g., parents) who may not have the willingness or tenacity to endure the repeated occurrence of a target behavior in order to implement consistently a consequent strategy. This is a particularly important concern due to the fact that many treatments for noncompliance are likely to be implemented by parents in a home setting. Antecedent strategies have been demonstrated as effective treatments for a variety of behaviors including academic engagement, (e.g., Allday and Pakurar 2007), oral reading fluency, (e.g., Eckert et al.

2002), and transition behavior (Sainato et al. 1987). For example, an antecedent strategy for academic work completion may involve modifying the difficulty or quantity of academic material presented to the individual in order to promote work completion.

Although there is a large literature base supporting antecedent strategies to promote compliance, a current systematic review of this literature does not exist. Therefore, the purpose of this paper was to synthesize the compliance literature to identify antecedent strategies that have been utilized specifically to increase compliance or reduce noncompliance in children.

Method

The first step in the systematic literature review was to search scholarly databases for articles to be included in the review. Recognizing that much of the child compliance literature has been published in journals devoted to the fields of psychology and education, two different scholarly databases (PsycINFO and ERIC) were searched using the same set of search terms. Specifically, the words “antecedent” and “errorless” were joined to the words “compliance” and “noncompliance” using the Boolean operator “AND” to return all studies containing combinations of those terms. This search returned 159 studies across both databases. Once duplicate articles were removed, 139 studies remained.

To be included in the review, a study had to meet three criteria. First, the study had to report the results of an experimental investigation. That is, other reviews, meta-analyses, and studies that did not intentionally manipulate an independent variable were excluded. Second, the study had to evaluate the effectiveness of an antecedent-based intervention in which intervention procedures were implemented prior to the occurrence of the behavior of interest (i.e., compliance or noncompliance). Third, the study had to evaluate the effectiveness of the intervention on one of two child or adolescent outcomes: (a) increasing compliance with a specific adult directive or request, or (b) decreasing noncompliance with a specific adult request.

The first and second authors each reviewed all 139 articles generated from the initial literature search to determine whether each met the inclusion criteria described previously. The application of the inclusion criteria narrowed the pool of articles to 42 the final number included in the review. Once the final pool of articles was determined, a set of coding procedures was developed and applied to all 42 articles in order to extract data relevant to the review questions. Specifically, the first author examined each of the articles and assigned a code to the

following variables based on the article’s content: (a) the number of participants, (b) the age of participants, (c) the type of antecedent strategy employed, (d) whether initial or completion compliance was evaluated, (e) whether any maintenance data were collected, and (f) the research design utilized. Additionally, to determine the degree to which specific antecedent strategies were considered empirically supported treatments (EST), each one was compared against commonly used criteria (Chambless et al. 1998) to classify them as well-established, probably efficacious, or experimental treatments.

A randomly selected subset of 20 % of the articles (i.e., 9) was also coded by the second author using the same coding scheme for the purposes of interobserver agreement (IOA). Agreement between raters was calculated using an exact IOA procedure (Cooper et al. 2007) by dividing the number of agreements between raters by the total number of agreements plus disagreements. IOA for the article coding procedure was 96.8 %. All disagreements were discussed between the first and second author and corrected until agreement reached 100 %.

Results

Table 1 presents the results of the systematic review and study coding process. Although not required as part of the inclusion criteria, 42 (100 %) of the articles utilized a single-subject design; however, this was not unexpected since antecedent interventions are typically conceptualized from a behavioral theoretical orientation, and the majority of behavioral intervention research employs a single-subject design. An increasing trend in publication rates was evident. The publication dates range between 1975 and 2014 with a majority of the studies published after the median of 1995 (30; 71.4 %). Furthermore, nearly half of the studies have been published since 2005 (18; 42.8 %). Most of the articles (25; 53.2 %) were published in journals devoted to applied behavior analysis, including the Journal of Applied Behavior Analysis (15; 35.7 %), Behavior Modification (4; 9.5 %), the Journal of Behavioral Education (2; 4.5 %), and Behavioral Interventions (1; 2.4 %). Different antecedent strategies investigated by individual studies included in this review included high-probability command sequences (14; 33.3 %), errorless compliance training (12; 28.5 %), command form (8; 16.6 %), eye contact (2; 4.8 %), time-in (6; 14.3 %), precorrection (3; 7.1 %), choice (1; 2.4 %), differential reinforcement of other behaviors and noncontingent reinforcement (2; 4.8 %), and alteration of rate of command delivery (1; 2.4 %). Totals exceed 100 % because several studies included two or more strategies.

Table 1 Demographic information for participants and study characteristic

Study	Design	WVC SCD standards	<i>n</i>	Child age	Child diagnoses	Intervention	Initiation or completion compliance	Outcome	Maintenance
Ardoin et al. (1999)	ATD	Does not meet standards ^{a,c}	3	7–9 years	3 with no diagnoses	HPCS	Completion	HPCS increased compliance with teacher requests in 2 of 3 participants	Effects maintained at 2- to 3-week follow-ups
Austin and Agar (2005)	Withdrawal	Does not meet standards ^{a,c}	4	4–6 years	4 with no diagnoses	HPCS	Initiation and completion	HPCS increased compliance in 3 of 4 participants	Not assessed
Axelrod and Zank (2012)	Multiple baseline across participants with embedded reversal	Does not meet standards ^{a,c}	2	10–11 years	1 with ADHD; 1 with no diagnosis	HPCS	Initiation and completion	HPCS increased compliance with teacher requests for both participants	Effects maintained following termination of intervention
Belfiore et al. (2008)	Withdrawal	Meets standards	1	7 years	1 with Down syndrome	HPCS	Completion	Intervention increased compliance with teacher requests	Effects maintained at 2-week follow-up when procedures were in place
Bellipanni et al. (2013)	Multiple baseline across participants, components counterbalanced across participants	Standards with reservations ^a	4	5–9 years	1 with ID, 2 with SLD	EID; time-in	Initiation	Both EID and time-in resulted in increases in compliance with teacher requests. Effects of combined EID and time-in resulted in improvements for one participant	Intervention integrity decreased for all but one teacher. High levels of compliance maintained for all but one participant
Cote et al. (2005)	ATD with reversal	Does not meet standards ^{a,c}	3	1 year	3 with no diagnoses	Warning; access to toy during transition	Initiation	Warnings and access to toys alone did not increase compliance	Not assessed
Davis et al. (1992)	Multiple baseline across trainers	Does not meet standards ^{a,c}	2	5–7 years	1 with Down syndrome, 1 with ASD	HPCS	Initiation and completion	HPCS resulted in improvements in compliance beyond that of continent praise as delivered during baseline	Effects were maintained at 2-, 3-, 4-, and 5-week follow-ups
Ducharme et al. (2000)	Multiple baseline across participants	Does not meet standards ^c	15	3–10 years	15 with no diagnoses	ECT	Initiation and completion	ECT resulted in increased compliance with trained and untrained requests. Parent report indicated decreased behavior problems	Effects were maintained at 1-, 3-, and 6-month follow-ups
Ducharme et al. (2001)	Multiple baseline across participants	Does not meet standards ^c	2	3–4 years	2 with no diagnoses	ECT	Initiation and completion	ECT resulted in increased compliance with trained and untrained requests. Reductions in parent stress were observed	Effects were maintained at 1-, 3-, and 6-month follow-ups

Table 1 continued

Study	Design	WWC SCD standards	n	Child age	Child diagnoses	Intervention	Initiation or completion compliance	Outcome	Maintenance
Ducharme and DiAdamo (2005)	Multiple baseline across participants with embedded reversal	Does not meet standards ^{a,b}	2	5 years	2 with Down syndrome	ECT	Initiation and completion	ECT increased compliance with researcher requests. Probes of generalization suggest improved compliance with teacher requests	Not assessed
Ducharme et al. (2010)	ABC design	Does not meet standards ^b	1	7 years	1 with ID/ODD/CD/ADHD	ECT	Initiation and completion	Concurrent implementation of ECT in home and school setting resulted in increased compliance with parent and teacher directives	Effects were maintained at 2- and 4-week follow-ups
Ducharme and Drain (2004)	Multiple baseline across participants	Meets standards	4	3–6 years	4 with ASD	ECT	Initiation and completion	ECT resulted in increased compliance with parent academic requests. Improvements generalized to untrained responses	Effects were maintained at 1-, 2-, 3-, and 6-month follow-ups
Ducharme and Ng (2012)	Multiple baseline across participants	Does not meet standards ^c	3	7–9 years	3 with ASD	ECT	Initiation and completion	ECT increased compliance with requests. Improvements in on-task behavior and decreases in off-task/disruptive were observed	Effects were maintained at 1-, 2-, 3-, and 4-week follow-up observations
Ducharme et al. (1994)	Multiple baseline across participants	Does not meet standards ^{a,c}	6	3–5 years	4 with DD, 1 with ADHD, 1 with no diagnosis	ECT	Initiation and completion	ECT resulted in improvements in compliance in both trained and untrained requests	Effects were maintained as far as 4-month follow-up
Ducharme and Popynick (1993)	Multiple baseline across participants	Meets standards	4	5–8 years	3 with DD, 1 with Down syndrome	ECT	Initiation and completion	ECT resulted in increased compliance with parent requests	Effects were maintained as far as 2-month follow-up
Ducharme et al. (1996)	Multiple baseline across participants	Meets standards	5	4–5 years	4 with DD, 1 with Down syndrome	ECT	Initiation and completion	ECT resulted in increased compliance with trained and untrained requests	Effects were maintained as far as 15 months post-intervention
Ducharme et al. (2007)	Multiple baseline across participants	Standards with reservations ^a	3	4–10 years	3 with ASD	ECT	Initiation and completion	ECT resulted in increased compliance with trained and untrained requests	Effects were maintained at 1- and 2-month follow-ups
Ducharme et al. (2002)	Multiple baseline across participants	Does not meet standards ^{a,c}	12	2–7 years	15 with no diagnoses	ECT	Initiation and completion	ECT resulted in increased compliance with trained and untrained requests. Parent self-esteem increased	Effects were maintained at 1-, 3-, and 6-month follow-ups

Table 1 continued

Study	Design	WVC SCD standards	n	Child age	Child diagnoses	Intervention	Initiation or completion compliance	Outcome	Maintenance
Ducharme and Worfling (1994)	Multiple baseline across participants with embedded withdrawal	Does not meet standards ^{a,c}	2	5 and 15 years	2 with ID	HPCS	Initiation and completion	ECT resulted in increased compliance with parental requests. Effects were maintained during fading	Effects were maintained at 1-, 3-, 6-, 8-, and 16-week follow-up observations
Everett et al. (2005)	Multiple baseline across participants	Standards with reservations ^a	4	4–9 years	1 with ADHD	EID; eye contact	Initiation	EID resulted in improved child compliance. Further improvements in compliance were observed with the introduction of eye contact	Not assessed
Ford et al. (2001)	Multiple baseline across participants	Does not meet standards ^{a,c}	4	5–6 years	4 with no diagnoses	EID; time-in	Completion	EID resulted in improved compliance with teacher requests. Further improvements were observed with sequential implementation of time-in	Effects were maintained at follow-up
Goetz et al. (1975)	Withdrawal	Does not meet standards ^{a,c}	1	3 years	1 with no diagnosis	NCR; DRO	Completion	NCR and DRO did not result in improvements in compliance	Not assessed
Hamlet et al. (1984)	Multiple baseline across participants	Does not meet standards ^{b,c}	2	11 years	2 with no diagnoses	Eye contact	Completion	Demanding eye contact resulted in improved compliance with teacher requests	Not assessed
Houlihan et al. (1994)	AB	Does not meet standards ^b	1	5 years	1 with ASD	HPCS	Completion	HPCS resulted in increased compliance at 5-s intervals, with smaller improvements at 20-s intervals	Not assessed
Kennedy et al. (1995)	Withdrawal and ATD	Does not meet standards ^{a,c}	2	18–19 years	2 with “severe disabilities”	HPCS; social comments	Completion	Both HPCS and social comments resulted in similar, improved levels of compliance in both participants	Not assessed
Mackay et al. (2001)	Withdrawal	Does not meet standards ^c	1	12 years	1 with ID	EID (precision requests)	Initiation	EID resulted in decreased noncompliance across settings	Not assessed
Mandal et al. (2000)	Multiple baseline across participants	Does not meet standards ^{a,c}	4	2–4 years	2 with language disorders, 1 with ID, 1 with no diagnosis	EID; time-in	Undefined	Both EID and time-in resulted in compliance with parent requests. Simultaneous implementation resulted in small additive effects	Not assessed
Marlow et al. (1997)	Multiple baseline across participants	Does not meet standards ^c	3	4–11 years	3 with language disorders	Time-in	Initiation	Time-in resulted in improved compliance with teacher requests. Addition of time-out resulted in higher rates of compliance	Effects were maintained at 1-month follow-up for 2 of 3 participants

Table 1 continued

Study	Design	WWC SCD standards	n	Child age	Child diagnoses	Intervention	Initiation or completion compliance	Outcome	Maintenance
Matheson and Shriver (2005)	Multiple baseline across participants	Does not meet standards ^{a,c}	3	2–4th grade	3 with no diagnoses	EID	Initiation	EID resulted in improved compliance with teacher requests. Corresponding improvements in academic behavior were observed	Not assessed
Olmi et al. (1997)	AB	Does not meet standards ^{b,c}	1	4 years	1 with language disorder	Time-in	Undefined	Time-in resulted in immediate improvements in compliance and reductions in aggression and elopement	Effects were maintained at 2-, 24-, and 40-week follow-ups
Penrod et al. (2012)	Multielement	Does not meet standards ^{a,c}	2	9–10 years	2 with ASD	HPCS	Completion	HPCS increased compliance with requests to eat nonpreferred food	Not assessed
Powell and Nelson (1997)	Withdrawal	Standards with reservations ^a	1	7 years	1 with ADHD	Choice	Initiation	Choice resulted in decreased noncompliance and other undesirable behaviors within the classroom	Not assessed
Rames-LaPointe et al. (2014)	Multiple baseline across participants	Standards with reservations ^a	3	5–6 years	1 with ADHD	ECT	Initiation and completion	ECT resulted in increased compliance with researcher requests	Generalization to teacher requests was observed one week following intervention for 2 participants
Ray et al. (1999)	Multielement	Does not meet standards ^{a,c,b}	1	5 years	1 with ASD	HPCS	Completion	HPCS resulted in increased compliance with both parent and teacher requests	Not assessed
Roberts et al. (2008)	Multiple baseline across subjects	Does not meet standards ^{a,c}	4	3–6 years	1 with Down syndrome, 1 with language disorder, 2 with no diagnoses	EID; time-in	Initiation	EID resulted in improvements in compliance for all participants. Small improvements in compliance were observed with the introduction of time-in	Effects were observed at 1-month follow-up
Rortvedt and Miltenberger (1994)	ABAC	Does not meet standards ^{a,c,b}	2	4 years	2 with no diagnoses	HPCS	Initiation and completion	HPCS increased compliance for one participant. Time-out resulted in improved compliance for both participants	Effects were maintained at 8-week follow-up
Schoen (1985)	ATD	Meets standards	1	6 years	1 with brain injury	Decreased commands; increased commands	Undefined	Increased commands resulted in decreased noncompliance	Not assessed

Table 1 continued

Study	Design	WWC SCD standards	n	Child age	Child diagnoses	Intervention	Initiation or completion compliance	Outcome	Maintenance
Singer et al. (1987)	Withdrawal	Does not meet standards ^{a,c,b}	4	7–10 years	2 with Down syndrome, 1 with ID, 1 with tuberous sclerosis	HPCS	Initiation and compliance	HPCS increased compliance for all participants	Not assessed
Stephenson and Hanley (2010)	Withdrawal	Does not meet standards ^{a,c}	4	2–4 years	4 with no diagnoses	Proximity; crouched next to child; touch; vocal attention; eye contact; interrupted activity	Completion	For 2 participants, compliance with teacher requests increased with multiple antecedent interventions were in place	Not assessed
Wilder et al. (2007)	Withdrawal	Does not meet standards ^{a,c}	3	2–3 years	3 with no diagnoses	Noncontingent access to item; warning; HPCS	Initiation OR completion	HPCS increased compliance for 1 participant. Antecedent interventions were ineffective for 2 participants	Not assessed
Wilder et al. (2010)	Withdrawal	Does not meet standards ^{a,c}	6	3–4 years	1 with ASD, 5 with no diagnoses	Rationales	Initiation OR completion	Rationales did not increase compliance for any participants	Not assessed
Zuluaga and Normand (2008)	Withdrawal	Does not meet standards ^{a,c}	2	4–5 years	1 with DD, 1 with language disorder	HPCS	Initiation and compliance	Improvements in compliance were only observed when HPCS was utilized in conjunction with contingent reinforcement	Not assessed

ASD autism spectrum disorder, DD developmental disability, ID intellectual disability, ADHD attention-deficit hyperactivity disorder, ODD oppositional defiant disorder, CD conduct disorder, SLD specific learning disorder

^a Insufficient data points per phase

^b Insufficient demonstrations of experimental control

^c Insufficient IOA

High-Probability Command Sequences

High-probability command sequences (HPCS) describe a procedure in which a sequence of requests with a high probability of compliance are issued to a child immediately before delivery of a low-probability request (Rortvedt and Miltenberger 1994). Delivery of requests in this manner creates a behavioral momentum that increases compliance with low-probability requests (Mace et al. 1998). Fourteen studies in the review (33.3 %), which included a total of 32 participants with ages ranging from 2 to 19 ($M = 6.8$), were identified for inclusion in the current review. Participants included in the studies had diagnoses of Down syndrome ($n = 4$), ADHD ($n = 1$), autism spectrum disorder (ASD; $n = 6$), ID ($n = 3$), DD ($n = 1$), language disorder ($n = 1$), tuberous sclerosis ($n = 1$), unidentified severe disabilities ($n = 2$), and no diagnosis ($n = 13$). Studies examined completion ($n = 6$) and both initiation and completion compliance ($n = 8$).

Davis et al. (1992) investigated the utilization of HPCS on two boys, aged 5 and 7, with diagnoses of Down syndrome and ASD. Three to five high-probability requests were rapidly provided immediately before low-probability requests. Implementation of HPCS resulted in immediate improvements in compliance, with improvements maintained following termination of the intervention. Singer et al. (1987) also found delivery of three to five requests to be effective in increasing compliance with teacher directions in four children aged 7–9 with severe disabilities. Kennedy et al. (1995) implemented a HPCS intervention in comparison with a social comment antecedent intervention, in which a comment (e.g., “it’s a beautiful day”) was delivered 2 s prior to a request. For the two participants, 18- and 19-year-olds with severe disabilities, both procedures were found to result in increased compliance with requests. Houlihan et al. (1994) found short interprompt intervals, such as those used in Kennedy et al. (1995), to increase compliance of a 5-year-old with ASD, with longer intervals (i.e., 20 s) having less positive effect on child compliance with adult requests.

Maintenance of effect of HPCS has been well investigated. Axelrod and Zank (2012) implemented HPCS in a general education classroom, and effects were maintained during fading of high-probability requests, with compliance during a maintenance phase being higher than baseline. Additionally, teachers included in the study found HPCS procedures to be acceptable. Ardoin et al. (1999) implemented HPCS with typically developing 7- and 8-year-old children, finding the procedure to result in immediate improvements in compliance. High-probability requests were faded throughout the intervention, beginning with three high-probability requests for every low-probability requests and gradually transitioning to the delivery of

only one high-probability request prior to a low-probability request. Compliance was maintained at a 2- and 3-week follow-up. Belfiore et al. (2008) implemented HPCS in which four high-probability requests were delivered to a 7-year-old male with Down syndrome prior to a low-probability request. HPCS was effective in increasing compliance with teacher requests, with results being maintained during a fading condition in which one high-probability request was delivered prior to a low-probability request. Fading of high-probability requests has also been found to be successful in additional research, with high levels of compliance being maintained when the intervention was removed entirely (Ray et al. 1999); however, it should be noted that reinforcement following three instances of compliance was provided during fading conditions, suggesting that a consequent strategy may have been necessary to maintain high rates of compliance in this case.

HPCS has also been applied to address food selectivity in 9- and 10-year-old children with ASD (Penrod et al. 2012). Implementation of the procedure resulted in increased compliance with requests to eat nonpreferred food. Results were observed across persons and environments. Despite the utilization of HPCS, it is also possible that increases in compliance were in part attributable to reinforcement via highly preferred food items.

In summary, HPCS is one of the most thoroughly researched antecedent strategies for increasing child and adolescent compliance. Studies have included a wide range of individuals with diverse disabilities, with the strategy receiving the most support for its utility with young children with no identified disability; however, additional research is required to better establish HPCS as efficacious for populations not frequently represented in the HPCS literature (e.g., ADHD). Furthermore, HPCS may be considered a “probably efficacious” treatment (Chambless et al. 1998) of childhood noncompliance as there are at least three single-case studies employing a good design that have compared HPCS to other treatments such as a pharmacological intervention (Belfiore et al. 2008) and alternative antecedent strategies (Kennedy et al. 1995; Wilder et al. 2007) and the studies have otherwise met the criteria for well-established treatments.

Errorless Compliance Training

Related to HPCS, errorless compliance training (ECT) involves the gradual introduction of low-probability requests—allowing the individual to demonstrate compliance at progressively lower-probability requests in an effort to prevent instances of noncompliance (i.e., errors). In ECT, requests are typically divided into four levels, with level 1 representing requests with which the child is most

likely to comply and level 4 representing requests with which the child is least likely to comply. As an individual demonstrates compliance at one level, requests from lower levels are systematically introduced. Twelve studies of ECT, which included a total of 60 participants with reported ages ranging from 2 to 10 ($M = 5.0$), constituted 28.5 % of studies reviewed. Participants included in the studies had diagnoses of Down syndrome ($n = 4$), ADHD ($n = 1$), ASD ($n = 9$), ID ($n = 1$), DD ($n = 11$), and no diagnosis ($n = 30$). All studies examined both initiation and completion compliance.

Ducharme and Popynick (1993) evaluated ECT with four children with developmental disabilities, finding the procedure to result in higher rates of compliance with parent requests. Additionally, improvements in compliance were maintained up to two months following discontinuation of intervention. Effectiveness of ECT for children with developmental disabilities was replicated in Ducharme et al. (1994) and Ducharme et al. (1996), with improvements in compliance being maintained as far as 15 months following intervention. Similar improvements in compliance with parent requests during intervention and follow-up were observed in three children aged 4 through 10 with diagnoses of ASD (Ducharme et al. 2007). In a subsequent evaluation of ECT, the procedure was implemented with two 5-year-old children with Down syndrome (Ducharme and DiAdamo 2005). Implementation of ECT resulted in improved compliance with researcher requests, with compliance remaining at high levels as low-probability requests were gradually introduced. In an evaluation of ECT with a 7-year-old with an intellectual disability, concurrent implementation in both home and school settings resulted in increased compliance in both settings (Ducharme et al. 2010). ECT has also been found to be effective for increasing compliance with parental academic requests in children with ASD (Ducharme and Drain 2004). ECT has also been documented to be effective in improving compliance in children from violent homes (Ducharme et al. 2000; Ducharme et al. 2001) and in children whose parents have a brain injury (Ducharme et al. 2002).

Additional research has found ECT to be effective in increasing compliance with teacher directives (Ducharme and Ng 2012). In addition to increased compliance in three children with ASD, rates of on-task behavior were observed to increase following the introduction of ECT. During follow-up, in which intervention was discontinued, increased compliance and on-task behavior were maintained. Consumer satisfaction with intervention procedures was reported to be high. Similarly, Rames-LaPointe et al. (2014) implemented ECT with three children in a general education kindergarten classroom. ECT resulted in improvements in compliance with researcher requests. Assessment of generalization revealed improved of

compliance to untrained requests by researchers, but not to requests delivered by the students' teachers. As with Ducharme and Ng (2012), treatment acceptability was reported to be high.

Studies of ECT provide support for the use of the procedure for addressing child and adolescent compliance. Similar to HPCS, use of ECT is best supported for children with no identified disability; however, the procedure also has strong support for addressing compliance in individuals with ASD and other developmental disabilities. Unfortunately, because the effectiveness of this strategy has only been compared to baseline rates of compliance, as opposed to another treatment, ECT is still considered an experimental treatment (Chambless et al. 1998). Thus, further evaluations of the strategy are necessary to better determine its utility relative to others.

Command Form

Eight studies included in the current review (16.6 %) examined the effect of command form. Studies included a total of 27 participants with reported ages ranging from 2 to 12 ($M = 4.8$). Participants included in the studies had diagnoses of ADHD ($n = 1$), Down syndrome ($n = 1$), language delay ($n = 4$), specific learning disorder ($n = 2$), ID ($n = 3$), and no diagnosis ($n = 17$). Initiation compliance was evaluated in six studies, with three studies targeting completion compliance and one that did not specify the type.

Effective instruction delivery (EID), a frequently implemented strategy, includes obtaining eye contact prior to issuing a directive, providing praise for eye contact, issuing the request in a directive form, allowing 5 to 10 s for compliance, and providing praise for compliance (Mandal et al. 2000). In a school-based study, Matheson and Shriver (2005) trained teachers to utilize EID with three general education students. Following teacher training, immediate improvements in use of EID were observed. Implementation of EID without praise resulted in immediate improvements in student compliance, with slight improvements in compliance being noted following the introduction of EID with praise. Researchers also noted that introduction of EID resulted in improvements in the on-task behavior and reductions in off-task or disruptive behavior. All teachers who implemented the procedure reported that the intervention resulted in benefits to the participants. Everett et al. (2005) evaluated the contributions of EID and eye contact. Four children between the ages of 4 and 9 were included, one of which had a diagnosis of ADHD. Following training in EID, improvements in compliance with parental directives were observed for all participants. The addition of establishing eye contact during the directive resulted in further improvements in

compliance. In a similar study, Ford et al. (2001) found the effects of EID to be slightly improved with the sequential introduction of time-in. Follow-up studies have produced mixed results regarding the additive effects of time-in. Whereas the addition of time-in resulted in greater compliance for all participants exposed to the combined intervention in Roberts et al. (2008), Bellipanni et al. (2013) found the combination of the two strategies to result in increased compliance in only one of four participants.

In a component analysis of command form, Stephenson and Hanley (2010) systematically introduced command form components with four children aged 2 through 4. Proximity to the child, crouching next to child, gently touching the child, delivering 5 s of vocal attention prior to the command, eye contact, and interrupting the child's activity were introduced sequentially. For two of the four children, compliance increased with the addition of each component. However, the addition of a three-step prompting procedure with contingent praise was necessary to increase compliance in two participants.

Relatedly, precision requests describe a procedure in which a hierarchy of prompts for compliance is utilized. Initially, requests are phrased with "please (requested behavior)." Praise is provided for compliance, with non-compliance resulting in a request in the form of "you need to (requested behavior)." If the second request results in compliance, praise is provided. Noncompliance results in punishment (e.g., removal of tangible) for a specified amount of time, at which point the precision request procedure is repeated. In a case study of the precision request procedure, Mackay et al. (2001) found compliance to increase in a 12-year-old child with an intellectual disability, with results replicated across various times of day.

In general, research in command form indicates the utility of these procedures (i.e., EID, precision requests) as a strategy for increasing child compliance. The use of the procedure is best supported for young children with no identified disability. Due to the small number of individuals with disabilities included in studies of command form, as well as the limited range of individuals with disabilities represented in the literature, further research is required to determine whether command form may be considered an empirically supported therapy for children and adolescents with identified disabilities. Similar to HPCS, there are at least three well-designed single-case studies comparing the effectiveness of a command form antecedent intervention to alternative treatments for increasing childhood compliance such as time-in (Bellipanni et al. 2013), eye contact (Everett et al. 2005), and three-step prompting (Stephenson and Hanley 2010) that otherwise meet criteria for a well-established treatment. Thus, antecedent interventions manipulating command form can be labeled "probably efficacious" treatments (Chambless et al. 1998).

Eye Contact

Although eye contact has been evaluated as a component of other antecedent procedures, its effect in isolation on child compliance has also been examined. Two studies included in the current review (4.8 %) examined the effect of eye contact. Studies included six participants with ages ranging from 4 to 11 ($M = 7.5$). Participants included in the studies had diagnoses of ADHD ($n = 1$) and no diagnosis ($n = 5$). Initiation compliance was evaluated in one study, as was completion compliance.

Hamlet et al. (1984) evaluated the effect of establishing of eye contact on compliance rates of two 11-year-old general education students. During the intervention, the instructor called the students name and waited 2 s for eye contact. No instructions were given until the student had made eye contact with the instructor for 2 s. If no eye contact was established, the instructor requested eye contact. Following establishment of eye contact, a command was provided. If eye contact was broken, the instructor again requested eye contact. Implementation of the procedure resulted in immediate improvements in the percentage of compliance with requests. The addition of eye contact to EID was found to increase the effectiveness of EID for promoting child compliance (Everett et al. 2005). As limited research has evaluated eye contact as a strategy for increasing compliance, it may only be considered an experimental treatment.

Time-In

Time-in can be considered to be the opposite of time-out. Time-in describes the presence of reinforcing environment in which brief, nonverbal, physical touch and contact, as well as verbal praise, are amply available (Christophersen 1986). Six studies (14.3 %) examined the effect of time-in. Studies included a total of 20 participants with reported ages ranging from 2 to 11 ($M = 5.2$). Participants included in the studies had diagnoses of Down syndrome ($n = 1$), language disorder ($n = 7$), ID ($n = 2$), specific learning disability ($n = 2$), and no diagnosis ($n = 8$). Initiation compliance was evaluated in three studies, two studies targeted completion compliance, and type of compliance was undefined in 1 study.

Olmi et al. (1997) investigated the use of time-in to address noncompliance of a 4-year-old with language deficits. Implementation of time-in resulted in substantial improvements in compliance with requests. Expanding on Olmi et al. (1997), Marlow et al. (1997) evaluated the efficacy of time-in and time-out on three children with language deficits, aged 4 through 11. Implementation of time-in resulted in immediate improvements in compliance with teacher requests. The addition of a time-out procedure

resulted in further improvements in rates of compliance for all participants. Maintenance was assessed one month following termination of the intervention, with two participants continuing to demonstrate improvements in rate of compliance. Teachers of participants rated the intervention as acceptable.

Time-in has also been evaluated in conjunction with EID (Mandal et al. 2000). Four preschool-aged children participated in the study, three of which presented with language delays. EID and time-in were introduced in isolation and in combination, with order of implementation counterbalanced across participants. Both EID and time-in were found to produce rapid and comparable improvements in compliance when implemented in isolation. Three participants experienced the combined intervention, with levels of compliance remaining undifferentiated from when one strategy was implemented in isolation—suggesting little additive effect of the two procedures in combination. Although findings of Bellipanni et al. (2013) indicate that increases in compliance associated with time-in are not further enhanced with the addition of EID, other researchers have found additive effects of the two strategies (Ford et al. 2001; Roberts et al. 2008). Overall, these findings indicate the utility of time-in as an antecedent compliance strategy relative to other strategies such as time-out (Marlow et al. 1997), EID (Ford et al. 2001; Bellipanni et al. 2013); the literature is limited by the relatively small number of studies evaluating the procedure. As such, time-in may be considered a “probably efficacious” treatment (Chambless et al. 1998)—with indications that the strategy may be useful for children with and without disabilities.

Precorrection

Precorrection, in which warnings or expectations are stated prior to issuance of a request, has been evaluated as a strategy for promoting compliance with requests. Three studies (7.1 %) included in the review examined the effect of precorrection on child compliance. Studies included 12 participants with ages ranging from 1 to 4 ($M = 2.5$). Participants included in the studies had diagnoses of ASD syndrome ($n = 1$) and no diagnosis ($n = 11$). Initiation compliance was evaluated in one study, whereas two studies evaluated both initiation and completion compliance.

Cote et al. (2005) evaluated the delivery of a warning (e.g., “two minutes to cleanup”) prior to delivery of a request on compliance levels of three typically developing children between the ages of 14 and 30 months. Additionally, Cote and colleagues evaluated whether informing the child of their ability to bring a toy to transition would increase compliance. For all children, precorrection

procedures were found to be ineffective in increasing compliance. Compliance was found to increase, however, following the introduction of an extinction procedure. Wilder et al. (2007) also evaluated the use of a warning procedure in comparison with noncontingent access to a preferred item and HPCS. Three 2- to 3-year-old children were included in the study. For all participants, warnings and noncontingent reinforcement were found to be ineffective for increasing compliance. Only one participant was found to respond adequately to an antecedent intervention (HPCS), with the addition of extinction being necessary to increase compliance in the remaining two participants.

Relatedly, the provision of rationales has been investigated as a precorrection strategy. Wilder et al. (2010) provided six children between 3 and 4 years of age with rationales for compliance (e.g., “give me the...because...”). For all six participants, the provision of rationales was found to be ineffective in increasing rates of compliance. Interestingly, the use of rationales in isolation was associated with increased levels of problem behavior for four participants. The addition of consequent procedures (e.g., guided compliance, contingent reinforcement) was necessary to increase compliance for all participants. Given that no researchers have found provision of precorrections to be effective in increasing compliance, the strategy cannot currently be considered an empirically supported treatment.

Choice

One study (2.4 %) included in the current review examined the effect of choice on compliance (Powell and Nelson 1997). The study included one 7-year-old participant with a diagnosis of ADHD. Compliance was defined as initiation compliance. During the intervention, the participant was provided with choices regarding assignments to be completed. During phases in which choice was provided, decreased levels of noncompliance were observed. Given the limited research in choice as a strategy for increasing compliance, it should be considered an experimental treatment.

Differential Reinforcement of Other Behavior and Noncontingent Reinforcement

The effects of differential reinforcement of other behavior (DRO), in which reinforcement is provided for engaging in any behavior other than noncompliance, and noncontingent reinforcement (NCR) have also been evaluated. Two studies (4.8 %) examined the effect of either DRO or NCR. Studies included a total of four participants with reported ages ranging from 2 to 3 ($M = 2.7$). Participants included in the studies had no diagnoses. Initiation compliance was

evaluated in six studies, with four studies targeting completion compliance.

Goetz et al. (1975) provided a 3-year-old with DRO in the form of social attention (e.g., “you’re wearing a pretty dress”), finding the procedure to result in decreased compliance with requests. NCR, in the form of teacher presence, was also found to be ineffective in increasing compliance. Contingent reinforcement was found to be effective in increasing compliance during the intervention. NCR was also found to be ineffective in increasing compliance by Wilder et al. (2007). Although only two studies have evaluated DRO and NCR as antecedent strategies for compliant behavior, neither has found the procedures to be effective. As such, DRO and NCR cannot be classified as empirically supported treatments.

Increased and Decreased Rate of Commands

One study (2.4 %) evaluated altering the rate of directives as a means of increasing compliance. Schoen (1985) evaluated whether modification of rate of commands was functionally related to level of child compliance. A 6-year-old with an emotional-behavioral disorder and a brain injury was exposed to conditions of increased and decreased rate of commands. Type of child compliance was not defined. Results of the study indicated that an increased rate of commands was associated with decreased non-compliance with requests, whereas a decreased rate of commands resulted in the highest percentage of non-compliance. As only one study has evaluated the effect of altering the rate of commands on child compliance, the strategy should be considered an experimental treatment.

Discussion

The purpose of this review was to identify antecedent interventions utilized to promote child compliance and determine the effect of these interventions on child behavior. Forty-two studies that included 135 children were included in the review. In general, we found antecedent strategies to be well represented within the child and adolescent compliance literature. For studies that assessed follow-up, data demonstrated maintained changes in child behavior. Antecedent interventions were primarily implemented with young children, with the mean age of participants in studies reviewed being 5.4 years. Despite the limited age range of participants, participants included children with no identified disability and for children with a variety of disabilities (e.g., ASD, ID, Down syndrome, language delays), suggesting the utility of antecedent manipulation with a wide range of children. Additionally, antecedent manipulations have increased child compliance

with requests from parents, teachers, and researchers—suggesting the ability of antecedent strategies to be beneficial in a variety of settings. Similarly, both initiation and completion compliance were found to be effectively addressed through implementation of antecedent strategies.

The current review identified diverse antecedent strategies utilized to promote child and adolescent compliance. Although antecedent compliance strategies in general have substantial empirical support, practitioners considering utilization of antecedent strategies must recognize that some strategies have been more thoroughly and rigorously researched than others. For example, many studies of ECT, HPCS, EID, and command form have been conducted; however, none meet the stringent standards required to be identified as an empirically supported treatment. This is primarily due to the requirement that single-case studies include a “comparison of intervention to another treatment” (Chambless and Ollendick 2001). The studies included in this review exclusively utilized single-case design, and almost all of them employed a design that compared the antecedent strategy to a no-treatment baseline phase. HPCS, command form, and time-in are to be considered probably efficacious treatments (e.g., Chambless et al. 1998) when utilized to address compliance in children. Thus, practitioners are encouraged to consider these strategies to promote compliance either in isolation, or in conjunction with consequent strategies as part of a comprehensive intervention plan (e.g., Kern and Clemens 2007). Research evaluating ECT, eye contact, choice, and increased rate of commands has indicated promising, albeit preliminary, support for the use of these strategies with children with no diagnoses. As such, practitioners may consider utilization of these strategies to be experimental and should exercise a degree of caution as limited research has demonstrated their utility or superiority to other interventions for children and adolescents with and without diagnoses. Although several studies included in the current review evaluated precorrection and NCR/DRO as a strategy for addressing child compliance (e.g., Cote et al. 2005; Goetz et al. 1975; Wilder et al. 2007, 2010), these strategies were not found to be effective in any evaluation and therefore should not be considered by practitioners to be useful antecedent strategies for addressing problems of child compliance.

Although not mandated in the inclusion criteria, all of the studies included in the present study utilized single-case design. This may be due to the fact that antecedent manipulation is rooted in behavior analysis, which primarily utilizes single-case design as a means of demonstrating functional relations between independent and dependent variables. When evaluating a body of research against the EST criteria (Chambless et al. 1998), there are two criteria unique to single-case design studies. The first is that the

studies made use of good experimental design; however, there is no explanation describing what constitutes such a design. Fortunately, the Institute of Education Science's (IES) What Works Clearinghouse (WWC) published standards that are useful for operationalizing the quality of single-case design (Kratochwill et al. 2010). The standards are comprehensive and mandate a specific number of data points per phase, a minimum level of IOA per phase, and a minimum number of demonstrations of experimental control, serve to increase the internal validity of single-case data, when met. Applying the criteria allows individuals to determine whether a study meets the WWC standards, meets the standards with reservations, or does not meet the standards.

Very few of the studies ($n = 10$) included in the present review met the WWC single-case design standards without ($n = 5$) or with ($n = 5$) reservations; however, it should be noted that an additional 20 studies included in this review would have been classified as meeting standards with or without reservations, but failed to report IOA by phase. That is, approximately 71 % of studies included an acceptable number of data points per phase and maintained experimental control through at least three demonstrations of effect. This likely represents a mismatch between the relatively new standards and outdated IOA reporting practices instead of actual unreliability. Thus, the 20 studies that otherwise met the WWC single-case design standards (Kratochwill et al. 2010) were all deemed to satisfy criterion IIA of the EST guidelines (Chambless and Ollendick 2001).

Limitations and Future Research

Research in antecedent strategies for compliance has been limited in participant population. Although individuals included in the reviewed studies had a variety of disabilities, only six of the 42 reviewed studies included children over 10 years. As such, it is essential that future researchers evaluate the utility of antecedent procedures for addressing compliance in older children and adolescents. Studies of antecedent manipulation for child compliance are also limited in that, with the exception of studies evaluating ECT, no studies evaluated generalized compliance across persons, settings, or commands. Given that deficits in compliance are often manifest across persons, places, and settings (e.g., McMahon and Forehand 2005), it is essential that future researchers evaluate the generalized effects of antecedent strategies. Relatedly, few studies in the review evaluated the generalized effect of antecedent interventions on behavioral correlates of compliance (e.g., disruptive behavior; Matheson and Shriver 2005; Powell and Nelson 1997). Given the keystone nature of

compliance, it is somewhat curious that relatively few researchers have investigated the effect of antecedent manipulation on both compliance and related behaviors.

One of the most notable limitations of the reviewed literature is the failure of many studies to meet WWC single-case design standards. Future researchers evaluating antecedent interventions through single-case design must attend to relevant design standards, particularly reporting IOA by phase—the predominant reason for studies in the current review failing to meet WWC standards with or without reservations. Antecedent manipulation research may also benefit from well-designed randomized controlled trials to further demonstrate the efficacy of specific antecedent strategies—particularly in comparison with other well-established treatments. Alternatively, researchers may consider conducting component analyses of already well-established treatment approaches for child and adolescent compliance that incorporate antecedent strategies (e.g., PCIT) to identify the relative contribution of antecedent manipulations. Additional research is particularly important for those strategies that have been evaluated in a limited number of studies or that have demonstrated limited efficacy (e.g., choice, eye contact, time-in, pre-correction, NCR). Lastly, as Kern and Clemens (2007) suggest that antecedent strategies may be differently effective for children who demonstrate skill and performance deficits, future researchers should consider collecting data regarding the cause of noncompliance when evaluating antecedent strategies. Such a determination may allow for better conclusions to be drawn regarding for whom and for what types of noncompliance antecedent interventions are most beneficial.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

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