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Quantifying Discipline Practices Using Absolute vs. Relative Frequencies: Clinical and Research Implications for Child Welfare

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Abstract

In the parent intervention outcome literatures, discipline practices are generally quantified as *absolute frequencies* or, less commonly, as *relative frequencies*. These differences in methodology warrant direct comparison as they have critical implications for study results and conclusions among treatments targeted at reducing parental aggression and harsh discipline. In this study, we directly compared the absolute frequency method and the relative frequency method for quantifying physically aggressive, psychologically aggressive, and nonaggressive discipline practices. Longitudinal data over a 3-year period came from an existing data set of a clinical trial examining the effectiveness of a psychosocial treatment in reducing parental physical and psychological aggression and improving child behavior ($N = 139$; Kolko et al., 2009). Discipline practices (both aggressive and nonaggressive) were assessed using the Conflict Tactics Scale (CTS; Straus et al., 1998). The two methods yielded different patterns of results, particularly for nonaggressive discipline strategies. We suggest that each method makes its own unique contribution to a more complete understanding of the association between parental aggression and intervention effects.

Keywords

parenting; discipline; measurement; externalizing behavior

Measuring and quantifying any behavior as dynamic and multifaceted as parenting is a complex, yet critical, endeavor. Measurement is the foundation of research and has consequences for each subsequent stage in the research process, including the interpretation of results and the drawing of conclusions. In the parenting intervention/prevention literatures, there is ample evidence that parenting interventions result in improved or maintained child behavior (Eyberg, Nelson, & Boggs, 2008; Kaminski, Valle, Filene, and Boyle, 2008). However, a more nuanced understanding of *how* these interventions work requires closer attention to measurement of the intervention targets, including parenting behaviors (Kazdin & Nock, 2003). There are two broad traditions for measuring the frequency of individual parenting strategies, such as aggressive discipline practices. These can be broadly categorized as the *absolute frequency* method and the *relative frequency* method. The two methods measure related, but conceptually distinct, constructs. The absolute frequency method measures how often certain discipline strategies are used,

whereas the relative frequency method measures the frequency of discipline strategies *relative to* the overall amount of discipline. The method chosen for a particular study will likely influence the study results and perhaps even the general conclusions that are drawn about the predictors, correlates, sequelae, and responsiveness to intervention of parenting behaviors. This may be particularly relevant for preventive interventions that target improving or supporting positive parenting behaviors to prevent the onset of child behavior problems or reduce the risk of parental aggression and maltreatment.

Absolute Frequency Versus Relative Frequency

To illustrate the critical distinction between absolute frequencies and relative frequencies, we give the following example of Parents A and B. Parent A uses 10 time-outs per month and 10 spankings per month whereas Parent B uses 20 time-outs per month and 30 spankings per month. (For simplicity, we will assume that these are the only two discipline strategies utilized by each parent.) Parent B uses time-outs more frequently than Parent A (20 versus 10) in absolute terms. However, in terms of *relative* frequency, Parent B uses fewer time-outs (40% of the time) compared to Parent A (50% of the time). If we define relative frequency scores in terms of the number of times a given discipline strategy was used during a period of time, divided by the number of times *any* discipline strategy was used during the same period of time, then the resulting values can range from 0.00 to 1.00. For example, if Parent A has a score of 0.16 for discipline strategy B, then Parent A has used discipline strategy B 16% of the time when their child misbehaved. These values then take on a straightforward interpretation: the *probability* that a parent will respond with a given strategy *when* he or she disciplines.

The Absolute Frequency Tradition

The absolute frequency method for quantifying discipline practices is perhaps most commonly used in the parent training and intervention/prevention literatures. However, this method sometimes leads to results that may seem counterintuitive, especially for nonaggressive discipline strategies (e.g., time-outs, removal of privileges). First, nonaggressive discipline strategies tend to be positively correlated with physically aggressive discipline strategies. For example, a study on the psychometric properties of the Conflict Tactics Scale reported positive correlations between nonviolent discipline (i.e., positive disciplinary practices) and psychological aggression and corporal punishment (Straus, Hamby, Finkelhor, Moore, & Runyan, 1998). In other words, parents who report using more nonviolent discipline strategies also reported being more psychologically or physically aggressive with their children.

Second, nonaggressive discipline strategies tend to be positively correlated or uncorrelated with child behavior problems when using the absolute frequency method. A study in a classroom setting with children with developmental disabilities found that effective behavioral discipline/teaching strategies (i.e., giving clear commands) were *more* likely to be followed by problematic or noncompliant behavior for the children with behavior problems (Carr, Taylor, & Robinson, 1991). In a more recent study, numerous nonaggressive discipline strategies, including time-outs and removal of privileges, were found to be uncorrelated with childhood aggression (Gershoff, Grogan-Kaylor, Lansford, Chang, Zelli, Deater-Deckard, & Dodge, 2010). Such results are difficult to interpret because they do not account for the *overall amount* of discipline.

Third, nonaggressive discipline strategies tend to decrease in frequency (or stay the same) following intervention. For example, in the Multimodal Treatment of ADHD (MTA) study positive/nonaggressive parenting discipline strategies remained unchanged following the

behavioral parenting intervention (Wells et al., 2000). Such results are difficult to interpret. A lack of significant change at post treatment does not necessarily mean that the intervention was not effective, as illustrated by the following example. Suppose that a parenting program teaches fathers to use time-outs as a strategy for managing misbehavior for pre-school age children. What should the experimental hypothesis be? We might expect that fathers will use more timeouts following the completion of the program because they are being trained to use time-outs. On the other hand, if the program is effective in reducing misbehavior, we might expect that fathers will use fewer time-outs following the completion of the program because time-outs are contingent upon child misbehavior and the amount of child misbehavior will have decreased as a result of the intervention. We can see from the above example that *either* outcome could be used as evidence that the program was effective. If fathers are using more time-outs, it is arguably because they were trained to use more time-outs. If fathers are using fewer time-outs, it is arguably because child behavior has improved. Thus, it is essential to account for child behaviors when assessing the occurrence and effectiveness of parental discipline practices (Emery, Binkoff, Houts, & Carr, 1983).

The Relative Frequency Tradition

Although less common, several studies have quantified discipline practices as relative frequencies (e.g., proportion scores). For example, Schuhmann et al. (1998) reported increases in the total frequency of maternal praise as well as the relative frequency of praise as a proportion of total parent talk as outcome measures in a Parent-Child Interactive Therapy (PCIT) trial. More recently, Chamberlain et al. (2008) used this type of technique to report on increases in use of positive reinforcement as a proportion of total self-reported parenting behaviors in a study of a parenting intervention for foster families. As it relates to the use of disciplinary practices, Simons and colleagues have noted that proportion scores can avoid confounding the use of harsher discipline with the severity of child behavior problems (i.e., that parents of children with more severe behavior may be more likely to use harsher discipline in response to that behavior) by examining the proportion of times that problematic behavior is met with a harsh parental response (Simons, Wu, Lin, Gordon, Conger, 2000). Snyder and Patterson (1995) have also used a similar approach to assess the likelihood of mothers' terminating conflict with their adolescents in response to adolescent aggressive behavior, thus providing an empirical test of the negative reinforcement of problem behavior that is predicted by coercion theory (Patterson, 1982).

Current Study

In the current study, we directly compared the *absolute frequency* method and the *relative frequency* method for quantifying parenting practices, including psychological aggression, physical aggression, and nonaggressive discipline. Using the two methods, we examined changes in discipline practices in response to treatment. The methods are compared in the context of a clinical trial of a modular treatment for childhood disruptive behavior disorders, the results of which have already been published elsewhere (see Kolko, Dorn, Bukstein, Pardini, Holden, & Hart, 2009; Shaffer, Lindhiem, & Kolko, in press). Treatment content, including parent-management training (PMT), was delivered in either research clinic or community settings. Goals of the treatment included promoting nonaggressive parenting strategies (both general strategies and discipline strategies), decreasing physically aggressive (e.g., hitting, slapping, threatening) and psychologically aggressive (e.g., screaming, yelling, name-calling) discipline strategies, and improving child behavior.

Method

Participants

Study participants included 139 child-parent dyads who were referred by affiliates of the study medical center for psychosocial treatment of child disruptive behavior problems. Inclusion criteria included child age range (6–11 years) and a current diagnosis of Oppositional Defiant Disorder (ODD) or Conduct Disorder (CD). Exclusion criteria included another concurrent treatment for a disruptive behavior disorder, child IQ below 70, and other indicators of major child psychiatric disturbance (i.e., suicidality with a plan, homicidality, substance abuse, and presence of an eating disorder or major psychiatric condition). Eligible families were screened via phone call and then scheduled for an initial assessment in the clinic. Of a total 704 families who were screened, 470 (67%) were ruled-out during the screen, 53 (8%) did not complete the initial assessment, and 42 (6%) were deemed ineligible during the initial assessment.

In the final study sample, 118 (85%) of the children were male and 21 (15%) were female. Based on parent report, 64 children (46%) were identified as African American, not of Hispanic origin, 66 children (47%) were identified as White, not of Hispanic origin, 8 children (6%) were identified as biracial, and 1 child (1%) was identified as Hispanic. Mean child age at initial assessment was 8.8 years ($SD = 1.6$). Eighty-five (61%) of parents were unmarried and mean family income was low to modest. Diagnostic criteria for ODD were met by 115 (83%) of child participants, and 29 (21%) met diagnostic criteria for CD (five children met criteria for both ODD and CD). Comorbid ADHD was present for approximately three-quarters (76%) of the sample. Additional details describing the participants can be found in our earlier paper describing child outcomes (Kolko et al., 2009).

Procedure

Treatment sessions were designed to be delivered weekly and therapists were encouraged to complete treatment within six months, allowing for cancellations or other minor treatment disruptions. On average, families participated in 18 treatment sessions (SD 8 sessions) over approximately four months. Treatment content comprised seven modules: 1) parent management training, 2) child CBT/skills training, 3) parent-child family sessions, 4) teacher consultation, 5) peer relations/community activities development, 6) medication consult for comorbid ADHD cases, and 7) crisis management. The content of these modules is described in greater detail elsewhere (e.g., Kolko, 1995, Kolko & Swenson, 2002) and has been found to be effective for treating children with behavior disorders (Kolko et al., 1990, 2009), child firesetters (Kolko, 2001), and families with high abuse-potential (Kolko, 1996a, 1996b; Kolko et al., 2011). Much of this treatment content has now been integrated into Alternatives for Families: A Cognitive-Behavioral Therapy (AF-CBT; see www.afcbt.org). The medication consult was conducted by a board-certified child and adolescent psychiatrist. All other treatment modules were administered by female therapists with a masters-level education, who were trained in cognitive-behavioral therapy and had at least two years' experience treating childhood externalizing problems. Additional details describing the study design, treatment content, and procedures can be found in our earlier paper describing child outcomes (Kolko et al., 2009).

Assessments were conducted at six time points: pre-treatment ($n = 139$), post-treatment ($n = 137$), 6-month follow-up ($n = 135$), 1-year follow-up ($n = 135$), 2-year follow-up ($n = 134$), and 3-year follow-up ($n = 129$). Attrition was very low (7%) through the follow-up phase of the study. All assessments were complete by research professionals who were blind to treatment condition and all other assessment data. The study was approved by the medical

center's IRB, and informed consent and child assent were obtained before the initial pre-treatment assessment.

Measures

Discipline strategies—Discipline strategies were assessed using the Conflict Tactics Scale (CTS; Straus et al., 1998). The CTS includes 22 items assessing various parental responses to child misbehavior. These include nonaggressive discipline strategies such as the use of time-outs or the removal of privileges, psychologically aggressive strategies such as yelling or name-calling, and physically aggressive strategies such as spanking or hitting. For each item the respondent is asked about the use of each strategy within the past year. Response options include: “this has never happened,” “not in the past year, but it happened before,” “once in the past year,” “twice in the past year,” “3–5 times in the past year,” “6–10 times in the past year,” “11–20 times in the past year,” and “more than 20 times in the past year.” The CTS was completed independently by parents and children at each of the six assessments.

Absolute frequency scores: Absolute frequency scores for nonaggressive discipline, psychological aggression, and physical discipline were calculated by summing the responses for the items within each category. Scores at pre treatment ranged from 0 to 24 for nonaggressive discipline strategies ($M_s = 11.24$ [Child Report] and 19.42 [Parent Report]; $SD_s = 5.59$ [Child Report] and 4.00 [Parent Report]), from 0 to 22 for psychological aggression ($M_s = 6.71$ [Child Report] and 5.54 [Parent Report]; $SD_s = 4.93$ [Child Report] and 5.19 [Parent Report]), and from 0 to 63 for physical discipline strategies ($M_s = 9.42$ [Child Report] and 13.01 [Parent Report]; $SD_s = 9.89$ [Child Report] and 7.57 [Parent Report]).

Relative frequency scores: Relative frequency scores for nonaggressive discipline, psychological aggression, and physical discipline were calculated by dividing the sum of the scores for the items within a category by the sum of the scores for all 22 items (e.g., physical discipline divided by total discipline). Resulting scores ranged from 0.00 to 1.00. Scores at pre treatment ranged from 0.00 to 1.00 for nonaggressive discipline strategies ($M_s = 0.48$ [Child Report] and 0.47 [Parent Report]; $SD_s = 0.21$ [Child Report] and 0.12 [Parent Report]), from 0.00 to 0.63 for psychological aggression ($M_s = 0.24$ [Child Report] and 0.25 [Parent Report]; $SD_s = 0.12$ [Child Report] and 0.08 [Parent Report]), and from 0.00 to 0.76 for physical discipline strategies ($M_s = 0.28$ [Child Report] and 0.28 [Parent Report]; $SD_s = 0.20$ [Child Report] and 0.12 [Parent Report]). It must be noted that these relative frequency scores cannot be interpreted as true proportions or ratios. Given that the CTS items are rated on an ordinal scale (not ratio) the resulting scores cannot be interpreted as absolute values but rather as relative trends that are either increasing or decreasing over time.

Data Analyses

Preliminary data analyses were conducted using SPSS (PASW 18), and treatment effects were examined via hierarchical Poisson models using the Hierarchical Linear and Nonlinear Modeling software program (HLM; Raudenbush & Bryk, 2002). Hierarchical Poisson models were conducted with time nested within participants, and full maximum likelihood estimation was used for all models. The level 1 equations for the unconditional models were $E(Y_{ti}|\pi_i) = \lambda_{ti}$ and $\log[\lambda_{ti}] = \pi_{0i} + \pi_{1i}(\text{Treatment}) + \pi_{2i}(\text{Follow-up}) + e_{ti}$, where Y_{ti} is the observed outcome score at time t for participant i . The “Treatment” variable was coded 0, 1, 1, 1, 1, and 1 for each of the six time points, allowing for the estimated treatment slope to be interpreted as pre-treatment to post-treatment change. The “follow-up” variable was coded 0, 0, 1, 2, 4, and 6, corresponding to each of the six follow-up time points, allowing for the

estimated follow-up slope to be interpreted as the average amount of change during the six-month follow-up period.

Results

Overview

Table 1 summarizes the response to treatment using the absolute frequency method and the relative frequency method. Effect sizes were calculated so that positive numbers indicate a decrease and negative numbers indicate an increase. Figure 1 graphically depicts these different patterns of results using the two methods. Using the absolute frequency method, all discipline strategies decreased from pre to post treatment. In contrast, the relative use of nonaggressive discipline *increased* from pre to post treatment using the relative frequency method.

Absolute frequency method

Using the absolute frequency method, all three categories of discipline strategies decreased from pre to post treatment ($p < .001$). There were continued decreases during the three-year follow-up period for nonaggressive discipline per parent report ($p < .01$) but not child report ($p > .05$). The frequency of psychological aggression reversed and increased during the three-year follow-up period per both parent and child report ($p < .001$). There were no significant changes in physical discipline strategies during the three-year follow-up period ($p > .05$).

Relative frequency method

Using the relative frequency method, a very different pattern of results emerged. From pre to post treatment, the relative use of nonaggressive discipline increased ($p < .001$), the relative use of psychological aggression did not change significantly ($p > .05$), and the relative use of physical discipline strategies decreased ($p < .001$). The relative use of nonaggressive discipline strategies reversed and decreased during the three-year follow-up period per parent report ($p < .05$) but not child report ($p > .05$). The relative use of psychological aggression increased during the three-year follow-up period per both parent and child report ($p < .001$). The relative use of physical discipline strategies continued to decrease during the three-year follow-up period for child report ($p < .05$) but not parent report ($p > .05$).

Discussion

This study compared the absolute frequency method and the relative frequency method of measuring self-reported parenting behaviors in multiple domains. The absolute frequency method quantifies discipline strategies as the absolute frequency of use within a specified time period. In contrast, the relative frequency method quantifies discipline strategies relative to the overall frequency of discipline strategies within a specified time period. Broadly speaking, both methods assess how often a parent uses a type of discipline strategy. Whereas the absolute frequency method measures how often certain discipline strategies are used, the relative frequency method measures the frequency of discipline strategies *relative to* the overall amount of discipline. This critical distinction leads to important differences in results that are relevant to the study of parenting interventions to reduce parental aggression.

The analyses in this study yielded very different patterns of results, depending on the method used to quantify discipline strategies. These differences were particularly noteworthy for nonaggressive discipline strategies, for which the results from the two sets of analyses were in the opposite direction. In response to intervention, the absolute frequency of nonaggressive discipline *decreased* whereas the relative frequency of nonaggressive

discipline *increased*. Parents used less nonaggressive discipline following treatment while simultaneously became more likely to use nonaggressive discipline relative to physical or emotional discipline. In other words, the treatment influenced both the *amount* and the *type* of discipline. Following treatment, parents disciplined less in general. But when they did discipline their children, they were more likely to use nonaggressive discipline strategies than they were prior to receiving treatment.

The two methods also yielded different patterns of results for psychological aggression. The rates of parents' psychological aggression did not change from pre- to post-treatment when using relative frequency scores, and psychological aggression increased in relative frequency over the follow-up period, using both parent and child reports. Although the intervention in the current study includes specific education for parents on psychological aggression (i.e., recommendations on emotion communication for one session, and later instruction on assisting a child in emotional identification and understanding, with an emphasis on helping a child feel listened to and valued within the family), it may be that more intensively targeted intervention is required in this area.

The two methods did not yield notable differences in results for physical discipline. Following treatment, physical discipline decreased both in terms of absolute frequency and relative frequency.

Implications for Parenting Interventions

The results in the current study have implications for interpreting the results of studies in the extant literature. For example, studies in the extant literature have reported no change, or even decreases, in positive, nonaggressive discipline following intervention (e.g., Forgatch & DeGarmo, 1999; Wells et al., 2000). As we have seen in this study, however, it remains possible (or even likely) that the relative frequency might have actually increased from pre- to post-treatment in these same studies. In other words, a failure to detect change in the absolute frequency of a given strategy does not necessarily mean that the treatment did not have an effect on the relative use of the strategy. The method used to quantify discipline practices will determine what conclusions, if any, can be drawn from the study. Few studies in the extant literature report on relative frequency or proportion scores, and we are not aware of any that report both absolute and relative frequency scores in the same manuscript. The implication for evaluating the benefit of parenting intervention programs, particularly those with a reducing aggressive behavior and increasing nonaggressive discipline, is clear. We expect that successful interventions will lead to a decrease in the absolute level of all kinds of discipline, but an increase in the relative level of nonaggressive discipline relative to physical discipline and psychological aggression. As such, it is critical to examine both absolute *and* relative frequencies of various discipline strategies when seeking to evaluate the efficacy of a parent training program.

Future Directions

The current study also has important implications for future research studies. As noted earlier, few studies have examined nonaggressive discipline strategies as an outcome. This gap in the literature needs to be filled, as numerous intervention programs include a component that instructs parents in nonaggressive discipline practices (e.g., time-out, providing alternatives). One implication of the current study for such future studies is that parental discipline practices need to be quantified in both absolute and relative terms in order to capture a more complete understanding of treatment effects. Although purely speculative, one reason why there are so few studies in the extant literature on discipline as an outcome might be that discipline is generally measured in absolute rather than relative

terms, leading to difficult-to-interpret or otherwise ambiguous results (e.g., use of time-outs decreases rather than increases).

Another important implication for future research is for studies of mediation effects. There are a growing number of studies examining the mediating effects of changes in parenting on improvements in child behavior or the prevention of child behavior problems. Most of these studies have examined the mediating effects of positive parenting on child behavior using composite or latent variables, which add statistical power to mediation analyses but can obscure treatment-related changes in specific parenting practices (DeGarmo, Patterson, & Forgatch, 2004; Forgatch, DeGarmo, & Beldavs, 2005; Patterson, DeGarmo, & Forgatch, 2004). We are aware of one study that has examined the mediating effects of changes in the proportion of positive reinforcement on child behavior (Chamberlain et al., 2008). We suggest that the routine use of measures of both absolute and relative parenting strategies will contribute to a more complete picture of mediation effects.

Limitations

One limitation of the current study was the exclusive reliance on parent and child reports of discipline strategies and child behavior. However, Hawes and Dadds (2006) have reported on the convergent validity and clinical utility of a self-report measure of parenting as compared to observations of parenting behavior in the context of a behavioral parenting intervention. Their comparisons found that measures of parenting behaviors converged well between self-report and observations as assessments of post-treatment improvement of various parenting practices. Furthermore, the results in the current study were generally consistent across parent and child reports of discipline strategies, adding support to the validity of the results.

Another limitation is that the set of response options on the CTS likely results in an underestimate of change over time. For example, one response option on the CTS is “11–20 times in the past year.” This means that a change from 20 to 15 would not indicate a change. Given that this results in a conservative estimate of change, actual change (absolute frequencies) is likely to be greater. In addition, and as noted earlier, the relative frequency scores based on CTS data cannot be interpreted as true proportions or ratios. Because the response options are ordinal rather than count, the relative frequency scores must be interpreted with regard to their trends and not their absolute levels. Despite this limitation, the data serve to illustrate the point that results can differ greatly when analyzed as absolute versus relative scores.

Summary and Conclusions

The absolute frequency method and the relative frequency method yielded very different patterns of results, particularly for nonaggressive discipline strategies (e.g., time-outs, removal of privileges). In response to intervention, the absolute frequency of nonaggressive discipline *decreased* whereas the relative frequency of nonaggressive discipline *increased*. Parents used less nonaggressive discipline following treatment while simultaneously became more likely to use nonaggressive discipline relative to physical or emotional discipline. In other words, the treatment influenced both the *amount* and the *type* of discipline. Following treatment, parents disciplined less in general, but when they did discipline their children they were more likely to use nonaggressive discipline strategies than they were prior to receiving treatment. We recommend that treatment studies evaluating changes in parental aggression and discipline examine and report changes in both absolute *and* relative frequencies of various discipline strategies.

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Figure 1.
Change in parenting behaviors from pre to post treatment and three-year follow-up.

Table 1

Summary of Hierarchical Poisson Models and Effect Sizes

Outcome Variable	Unconditional pre-post slope			Unconditional follow-up slope			Effect Size	
	B	SE	t	p	B	SE	t	p
A. Absolute Frequency Method								
Nonaggressive Disc. - C	-0.17	0.04	-3.93	0.000	-0.00	0.01	-0.07	0.946
Nonaggressive Disc. - P	-0.14	0.02	-7.12	0.000	-0.01	0.00	-2.86	0.005
Psych. Aggression - C	-0.30	0.06	-4.97	0.000	0.05	0.01	3.99	0.000
Psych. Aggression - P	-0.25	0.03	-7.89	0.000	0.03	0.01	3.87	0.000
Physical Discipline - C	-0.63	0.09	-7.38	0.000	-0.03	0.02	-1.39	0.167
Physical Discipline - P	-0.62	0.05	-11.82	0.000	-0.01	0.01	-0.95	0.345
B. Relative Frequency Method								
Nonaggressive Disc. - C	0.15	0.04	3.81	0.000	-0.01	0.01	-1.16	0.247
Nonaggressive Disc. - P	0.16	0.02	8.26	0.000	-0.01	0.00	-2.53	0.013
Psych. Aggression - C	-0.02	0.06	-0.42	0.671	0.04	0.01	3.89	0.000
Psych. Aggression - P	0.04	0.02	1.57	0.119	0.03	0.01	4.54	0.000
Physical Discipline - C	-0.31	0.07	-4.64	0.000	-0.04	0.01	-2.25	0.026
Physical Discipline - P	-0.38	0.04	-8.48	0.000	-0.01	0.01	-1.29	0.201

C = Child Report; P = Parent Report