Research Article

Are Children in Foster Care Settings More Likely to Display Challenging Behavior on Specific Days of the Week?

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Academic Editor: Karyn Ogata Jones

Abstract

Previous studies have shown that the use of a three-color (red, yellow, and green) rating system of child behaviors by caregivers can help facilitate deprescribing of psychotropic medications in foster youth. Using a similar three-color rating system within a state-funded project, we assessed whether there was a day of the week when 48 foster youth consistently displayed challenging behavior. For each foster child, we used conditional probability analyses to determine if there was a day of the week with an increased probability of challenging behavior as indicated by a red or yellow code. For the caregiver of each foster child, we also used conditional probability analyses to determine if there was a day of the week with an increased probability of missed data collection. Overall, the findings indicate red codes for challenging behavior were statistically most probable on Saturdays and Sundays, and caregivers were statistically most and least likely to miss data collection on Fridays and Mondays, respectively. We discuss how similar data collection procedures could be modified to address the needs of foster youth and other children who display challenging behavior in home settings.

1. Introduction

In 2021, The Administration for Children and Families (ACF) [1] reported that an estimated 407,000 children remained in foster care at the end of Fiscal Year 2020 [1]. The United States Department of Health and Human Services [2] reported the primary reason for a child's removal from their home was neglect (63%), followed by parental drug abuse (35%), caretaker inability to cope (14%), and physical abuse by a caregiver (12%). According to the ACF [1], 44% of foster children were placed in a non-relative placement, which reflects a large number of foster parents in the US. Additionally, the majority of case plan goals (53%) targeted reunification with either the child's parent(s) or primary caretaker(s); the next most frequent case plan goal was adoption for 28% of the cases [1]. In both scenarios, the pathway to achieving the stated goal is likely influenced by the presence and severity of challenging behavior displayed by the respective foster child.

Research has consistently shown that adverse childhood experiences (ACEs) increase the likelihood of poor physical, mental, and behavioral health, and that detrimental outcomes increase as the number of ACEs increases [3]. Given the high frequency of ACEs in foster youth [4], it is no surprise that many youths in child welfare systems display externalizing or challenging (i.e., difficult to manage) behaviors. In fact, youth with complex trauma (i.e., experiences from two or more categories of sexual abuse, physical abuse, emotional abuse, neglect, or domestic violence) were more likely to have behavior problems [5]. Specifically, studies suggest foster children present with more attention problems, social problems, and aggressive behaviors [4], as well as more mental health diagnoses [6, 7]. For example, a study of the California child welfare system found that foster and kinship parents reported an average of 5.77 challenging behaviors a day, and that increased levels of such behaviors decreased the stability of the child's placement (i.e., increased the probability of a placement disruption), especially when the foster child was in a non-relative placement [8]. In addition to increased placement disruptions, one study found that challenging behavior was a dynamic risk factor that predicted a youth's reentry into the foster care system [9].

Another unique component of foster care is the consistently high use of psychotropic medications. As it relates to psychotropic medication use, studies consistently find that foster youth are prescribed psychotropic medications at higher rates than youth not in foster care [10-12], with inconsistent guidelines [13], and at levels that constitute polypharmacy [14]. To compound these issues, studies have also found that even with improved behavior, foster youth infrequently experience deprescription (i.e., systematic decrease in medication dosage or count) of psychotropic medications without directly training stakeholders to advocate for the foster child [7, 13, 15-18]. In an attempt to increase collaboration amongst stakeholders and prescribers, results from a recent study [19] suggested one potential way to facilitate deprescription for children in child welfare was to teach their caregivers to (a) communicate clearly with their prescriber, (b) provide daily ratings of their foster child's behavior, and (c) share a graphical display of the weekly ratings of the child's behavior during appointments with their prescriber. In their preliminary analysis, Coon et al. [19]

utilized conditional probability analyses and found prescribers were most likely to increase medication following reporting periods with consistent levels of "red" or difficult to manage days; most likely to make no change to medications following reporting periods with consistent levels of "yellow" or somewhat difficult to manage days; and most likely to decrease medications following reporting periods with consistent levels of "green" or easy to manage days. Other researchers have also used conditional probability analyses to identify precursor variables for severe behaviors [20, 21] and inappropriate mealtime behavior [22], isolate variables associated with problematic transitions for children with intellectual and developmental disabilities [23], and increase preschoolers' compliance with instructions from teachers [24].

As a collective whole, the high prevalence of psychotropic medications, mental health disorders and corresponding challenging behaviors in foster youth likely give rise to multiple difficulties for caregivers. As such, studies consistently highlight the need to (a) track and assess challenging behaviors and (b) provide therapeutic services for both caregivers and foster youth. Although the procedures described by Coon et al. [19] were created to track the effects of, and the possible need to modify, behavioral and pharmacological (when appropriate) interventions, the three-color daily system and conditional probability analysis could help inform other aspects of foster youth's lives. Specifically, such data could allow practitioners and stakeholders to identify days that are consistently challenging for a child and thus arrange support and resources to best address those challenges. In addition to arranging support within the child's home, other interventions could be modified to better support foster youth and their caregivers during time periods associated with higher levels of challenging behavior.

Using the three-color daily data collection system described by Coon et al. [19], the purpose of this retrospective (file review) descriptive study was to determine whether participants were more likely to display challenging behavior on a specific day of the week. As a secondary question, we also evaluated whether caregivers were more likely to miss data collection on a specific day of the week. Knowing this information could be helpful for practitioners to preemptively guide allocation of resources and training, as well as to modify therapeutic interventions during more challenging periods.

2. Methods

2.1 Participants

Participants were 48 children in state custody who displayed challenging behavior in their home or at school. They were referred by caregivers, physicians, Department of Human Resources (DHR) case workers, and DHR administrators to a state-funded team for behavioral services provided by licensed behavior analysts (LBAs) [16]. Table 1 shows demographic information for the 48 participants. The mean age was 8.40 years (range, 1-18). All participants had an open case or were adopted through a state DHR child welfare system within a 4-year period. To be eligible for services, participants had to reside within a specified 10-county catchment area within the state. Within this catchment, DHR arranged placement for each participant in (a) a foster home, (b) an adoptive home, or (c) a biological home (i.e., the individual was at risk of removal). Hereafter, we generically refer to participants in (a), (b), and (c) as children and adolescents in foster care. To be included in this retrospective study, the participants' families had to receive services (including training in data collection procedures) for a minimum of 90 days. Although the state-funded team provided various

behavioral services by LBAs and psychotropic medication review services by a Child Psychiatrist and a Psychiatric Nurse Practitioner [13], the current study was limited to the daily data collection component of behavioral services. Notably, practice standards require LBAs to regularly collect data on their client's target behaviors. A university institutional review board approved this study and all research personnel complied with procedures to assure ethical treatment of human subjects.

Table 1 Participant Demographic Information.

	n	%
Gender		
Male	29	60
Female	18	38
Non-binary	1	2
Age		
1-5	11	23
6-10	24	50
11-18	13	27
Racial identity		
Black	23	48
White	23	48
Other (Biracial)	2	4

Note. Racial identities and gender as reported by caregivers during intake*.* Caregivers were able to select multiple racial identities for their child.

2.2 Data Collection

During the first 30 days of providing behavioral services to each family, an LBA trained one of the child's caregivers to rate their child's behavior each day. To complete the rating, one automated email was sent each day at the same time (the caregiver specified the time the email was sent), and the same caregiver completed the daily rating for the same child throughout services. The automated email included a link to a behavior rating form on Qualtrics™. As a part of the process of training caregivers to use the daily rating system, LBAs (a) provided objective definitions of green, yellow, and red days based on behaviors discussed during intake and (b) showed caregivers how to access the daily link to complete the rating. As described by Coon et al. [19], LBAs instructed caregivers to rate the child's behavior for that day as (a) green if the child displayed one or two minor behaviors that were easily managed, (b) yellow if their child displayed either multiple minor or one to two major behaviors that were somewhat hard to manage, and (c) red if their child displayed multiple minor behaviors in addition to major episodes of challenging behaviors (e.g., aggression, tantrum, damaging property) that were difficult to manage. The LBAs individualized the examples for each participant based on behaviors described during their intake. After the caregiver selected the link, it instructed them to select the behavior rating that reflected their child's behavior for that day. Regardless of the rating, caregivers could also include descriptive information about the events of the day. Caregivers typically completed daily behavior rating forms in approximately 1 min.

LBAs created two charts from the daily data collect by caregivers: one depicted daily behavior and one depicted weekly averages of behavior. Although weekly averages of behavior were analyzed for clinical purposes, those data are not included in the present study as they were not pertinent to the research questions.

2.3 Data Analysis

Researchers entered data from daily behavior rating forms into Microsoft Excel™ workbooks. Thereafter, researchers calculated frequency counts for each behavior rating for each day of the week, for *each* participant. Then, using equation (1), as described by Kolmogorov [25], researchers calculated conditional probabilities across days of the week for each participant:

$$P(A|B) = \frac{P(A \cap B)}{P(B)} \tag{1}$$

In this equation, $P(A \cap B)$ is the intersection of event (A) and conditional event (B), and $P(B)$ is the unconditional probability of event (B). For example, if a caregiver recorded behavior ratings for 150 days, 23 of which were on a Monday and 10 of those Monday ratings were scored as red, this information could be used to calculate the probability of a red day occurring, given it is a Monday. First, researchers would calculate $P(A \cap B)$, which is 10 (number of Mondays with a red rating) divided by 150 (total number of days), which equals 0.067. Then, researchers would calculate $P(B)$, which is 23 (number of Mondays) divided by 150 (total number of days), which equals 0.1533. Thus, $P(A|B)$ is 0.067 divided by 0.1533, which equals 0.43. Researchers repeated this process to calculate conditional probabilities across all three behavior ratings (i.e., red, yellow, and green) for all seven days of the week for each of the 48 participants. Researchers also used this equation to calculate the conditional probability of missing behavior ratings for the caregivers of the 48 participants. Said differently, researchers calculated the conditional probability that a caregiver failed to provide a behavior rating for each day of the week. On rare occasions, the automated message was disrupted due to system problems or upgrades. These instances were excluded from the analyses.

Thereafter, the third author winsorized [26] outlier values and calculated z-scores for each participant for (a) the conditional probability of a red or yellow behavior rating across all seven days of the week (n = 336) and (b) the conditional probability of missing behavior ratings across all seven days of the week (n = 336). This process ensured that participants with more data (i.e., these who received services longer) did not differentially affect the probabilities when we merged the individual data sets. We combined red and yellow ratings into a single category for analysis because previous research indicates (a) an inverse relation between challenging behavior and placement stability [8] and (b) prevalent challenging behavior by a child as a dynamic risk factor that predicts their reentry into the foster care system [9]. Moreover, the use of behavior ratings in the current, retrospective study differs from that described in the Coon et al. study. In the Coon et al. study, the question was whether prescribers made decisions about increasing, decreasing, or not changing psychotropic medication based on the predominant behavior rating (i.e., red, green, or yellow, respectively). In the current study, we evaluated whether there was a day of the week (notably, events on specific days of the week) during which challenging behavior was more likely to occur.

Based on z-scores, the third author conducted a one-tailed test to identify statistically significant conditional probabilities for each event (i.e., z-scores greater than 1.65) indicating an increased

likelihood of challenging behavior. Using these data, the third author calculated the percentage of significant z-scores for each day of the week by counting the number of significant z-scores, dividing by the total number of z-scores for that day of the week, and multiplying by 100. As there were 48 participants, each day of the week had 48 total corresponding z-scores. The third author conducted this analysis for the conditional probability of red or yellow ratings and missing ratings. The third author also calculated the mean z-score for each day of the week for red or yellow behavior ratings and missing behavior ratings across participants. Z-score calculations were conducted using SPSS (Version 29.0). Finally, to analyze the conditional probability of each conditional event (i.e., color ratings and missing ratings), the third author compared mean differences in z-scores across days of the week using Kruskal-Wallis tests. Although an analysis of variance (i.e., ANOVA) is typically used to compare mean difference between k ($k > 2$) groups, this analysis requires the following two assumptions: (a) data are normally distributed and (b) groups have equal variances. These assumptions were not met with data sets for either analysis; this is common with smaller N data sets from applied settings [27]. For such scenarios, the Kruskal-Wallis test serves as an appropriate nonparametric test of the significance of mean differences between groups [27, 28].

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Authors complied with all ethical requirements during the conduct of this study.

3. Results

Across the 48 participants, caregivers collected data for an average of 304 days (range, 101-863) during which they completed an average of 179 daily ratings (range, 18-736) and missed an average of 125 ratings (range, 2-567).

3.1 Red and Yellow Ratings

Figure 1 depicts the percentage of z-score values that were greater than or equal to the critical value of 1.65 for conditional probabilities of red or yellow (i.e., any challenging behavior) ratings for each day of the week. The numerical value above each bar indicates the number of participants with a significant z-score value for that day. Said differently, for each day of the week, we calculated the percentage of participants with significantly greater likelihood of challenging behavior for each day of the week. Thus, for each day of the week, percentages were calculated based on data for all 48 participants. In addition, one participant may have displayed a significantly greater likelihood of challenging behavior across more than one day of the week. Results indicate Sunday and Saturday had the highest percentages (12.5%) of statistically significant z-score values. That is, the highest percentage of participants displayed their highest levels of challenging behavior during the weekend days.
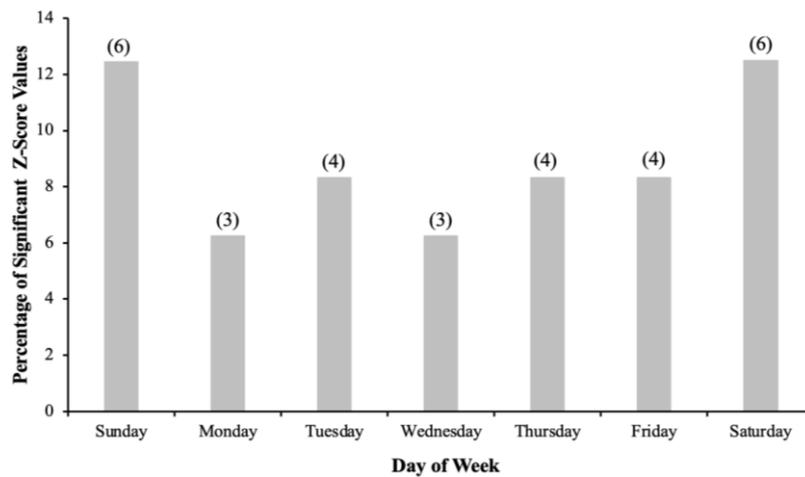
Figure 1 Significant Z-Scores Across Days for the Conditional Probability of Challenging Behavior. *Note.* Number in parentheses indicates number of participants with significant z-score values. Z-scores equal to or greater than 1.65 were considered significant in this calculation.

Figure 2 depicts the mean z-score values for red or yellow (i.e., any challenging behavior) ratings across days of the week. Overall, red or yellow ratings were low probability events. All participants displayed some challenging behavior, but some individuals displayed challenging behavior that gave rise to an increased likelihood of a red or yellow rating on multiple days of the week. Specifically, six of the 48 participants demonstrated significantly greater likelihood of challenging behavior across two or more days of the week. Five of these participants demonstrated greater challenging behavior on three or more days of the week. Thus, these individuals and their caregivers may warrant additional support on those days. On average, Sundays had the greatest mean z-score value for red or yellow ratings with a mean of 0.052. Conversely, Thursdays had the lowest mean z-scores value for red ratings with a mean of -0.073. These data indicate the overall likelihood of challenging behavior for the entire group of participants. This likelihood increased on Sundays and *decreased* on Thursdays. Finally, a Kruskal-Wallis test was conducted to evaluate differences in mean z-scores for red ratings across days of the week; results indicated the differences described above were not statistically significant for the participants as a group ($H(6) = 0.615$, $p = 0.99$).
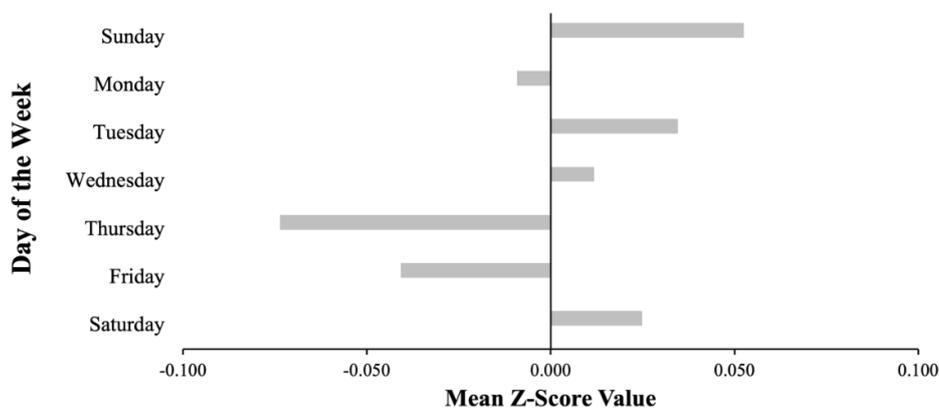

Figure 2 Mean Z-Score Values Across Days for the Conditional Probability of Challenging Behavior. *Note.* Mean z-score values may take on negative values. Thus, the vertical axis crosses the horizontal axis at 0.

3.2 Missing Ratings

Figure 3 depicts the percentage of z-score values that were greater than or equal to the critical value of 1.65 for conditional probabilities of missing behavior ratings for each day of the week. The numerical value above each bar indicates the number of participants with a significant z-score value for that day. Again, for each day of the week, we calculated the percentage of participants with significantly greater likelihood of missing ratings for each day of the week. Thus, for each day of the week, percentages were calculated based on data for all 48 participants. In addition, one participant may have displayed significantly greater likelihood of missing ratings across more than one day of the week. These results indicate Tuesday had the greatest percentage of statistically significant z-score values. That is, the highest percentage of caregivers displayed a significantly higher probability of *not* submitting behavior ratings on Tuesdays.
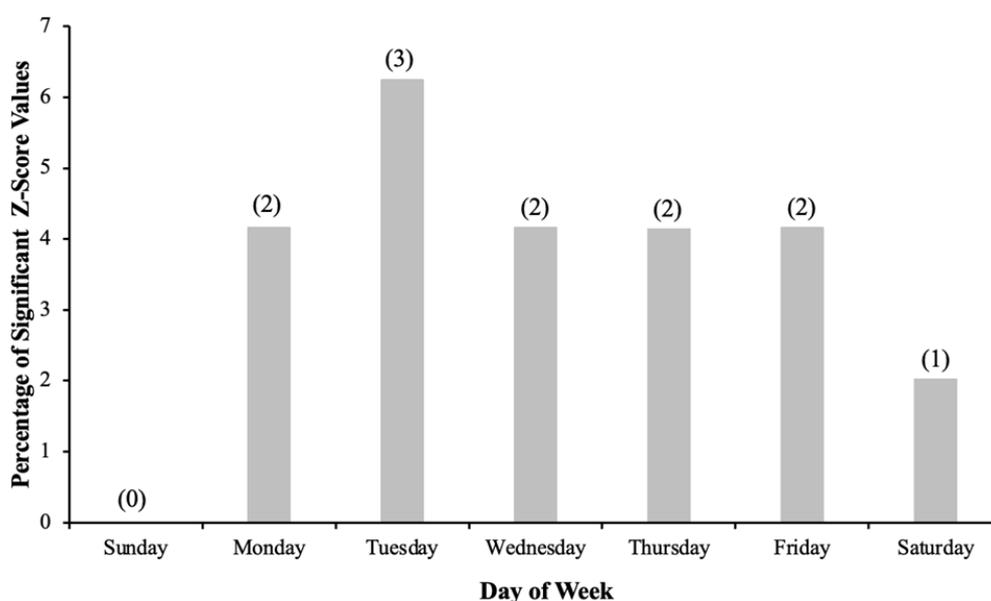

Figure 3 Significant Z-Score Values Across Days for the Conditional Probability of a Missing Rating. *Note.* Number in parentheses indicates number of participants with significant z-score values. Z-scores equal to or greater than 1.65 were considered significant in this calculation.

Figure 4 depicts the mean z-score value for missing behavior ratings across days of the week. On average, results indicate Fridays had the greatest mean z-score value for missing ratings with a mean of 0.066. By contrast, Mondays had the lowest mean z-score value for missing ratings with a mean of -0.069. These results indicate caregivers were most and least likely to omit a behavior rating on Fridays and Mondays, respectively. All caregivers missed ratings, but some individuals consistently missed ratings on multiple days of the week. Three of the 48 participants demonstrated a significantly greater likelihood of missing ratings across two or more days of the week. For caregivers who consistently miss ratings, additional prompts may be necessary to improve the integrity of their reporting. In addition, two of these three participants *also* demonstrated significantly greater likelihood of challenging behavior on two or more days of the week. Taken together, these findings indicate that for some individuals, managing elevated levels of challenging behavior may serve as a barrier to consistently rating behavior. Thus, providing support to manage challenging behavior

effectively may, in turn, increase reporting for these caregivers. A Kruskal-Wallis test was conducted to evaluate differences in mean z-scores for missing ratings across days of the week. Again, results indicated the difference across day was not statistically significant for the participants as a group ($H(6) = 0.559$, $p = 0.99$).
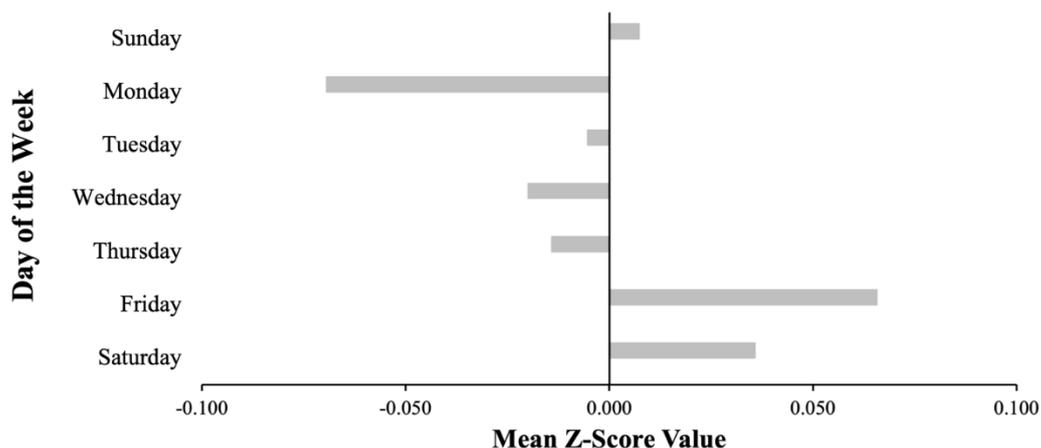

Figure 4 Mean Z-Score Values Across Days for the Conditional Probability of a Missing Rating. *Note.* Mean z-score values may take on negative values. Thus, the vertical axis crosses the horizontal axis at 0.

4. Discussion

The purpose of the current study was to use conditional probability analysis methodology to determine if there was a day of the week with an increased likelihood that caregivers (a) coded their child's behaviors as red or yellow (i.e., difficult to manage) and (b) missed data entry opportunities. Overall, the findings indicate that foster children were more likely to have a red or yellow day on Saturdays and Sundays and least likely to display challenging behavior on Thursdays. Furthermore, mean z-scores indicated Sundays had an elevated likelihood of challenging behavior across participants. It is important to note these conclusions are based upon the comparison of relative levels of these conditional events for individuals rather than statistically significant differences for the group as a whole. At the group level, tests of significance did not identify significant increases in the probability of either conditional event for any day of the week. We attribute this lack of statistically significant findings to (a) idiosyncratic patterns of behavior, (b) a small sample size, or a combination of both. Nevertheless, this study illustrates how practitioners can use the behavior coding system to detect weekly patterns of challenging behaviors for individual children.

The reasons for Saturdays and Sundays being especially difficult for participants are unclear; however, there are possibilities worth noting. Most caregivers anecdotally reported changes to daily routines on weekends. Such changes may have been associated with fewer preferred activities than other days of the week, as well as with later bedtimes for both caregivers and foster youth. Specifically, participants' routines on Saturdays and Sundays varied depending on the participant's home, but most caregivers reported having less structure on weekends, as well as completing routine tasks such as grocery shopping. We speculate that the increased likelihood of challenging behavior on weekends could be due to a change in routine from weekdays or an increased amount of unstructured time [29]. Taken together, these environmental variables can produce higher levels of challenging behavior, especially for younger participants.

Additionally, caregivers were most likely to miss data collection on Fridays and least likely to miss data collection on Mondays. Changes in routines and schedules may also affect caregivers to the extent that they are less likely to implement behavioral strategies with high fidelity when their routine changes. Specifically, caregivers may find it harder to implement components of a behavior plan when they alter daily routines, more children or family members are in their home, or both. When a caregiver is unable to implement a behavior plan with fidelity, their child may display more challenging behavior during that period. In sum, these data suggest there are specific days of the week that are consistently more challenging for participants and caregivers alike and highlight days that foster families may need additional support.

On the individual level, many participants displayed a significantly greater likelihood of challenging behavior, missed ratings, or both across multiple days of the week. By analyzing data from individual daily reports and identifying trends across participants, practitioners may be able to identify cases that require additional training, days of the week that may require additional support for families, and individualized behavioral plan that require new intervention components. Related to missed ratings, identifying days with low levels of cooperation with data collection may point to days with overall diminished cooperation with treatment plans. If the caregiver does not complete the daily report (a low-effort task) for a given day, it seems unlikely they are completing other components of their foster child's treatment plan. As such, by identifying days with lower cooperation with data collection and potentially lower treatment adherence, practitioners may be better suited to adjust environmental supports as needed.

To better understand the needs of these cases, future research should evaluate how managing elevated levels of challenging behavior may serve as a barrier to consistent data collection among caregivers. Specifically, future studies should evaluate the extent to which challenging behavior serves as a conditional event for missing data. That is, researchers should use conditional analysis procedures to evaluate the likelihood of challenging behavior either preceding or following days with missing behavior ratings. In the case of the former, this may indicate the caregiver (a) temporarily failed to adhere to the treatment plan, (b) was occupied managing challenging behavior, (c) did not want to report persistent challenging behavior, or some combination thereof. Although individuals have unique histories, foster youth typically experience a similar weekly structure of attending school and extracurricular events, participating in familial visits, and attending various therapeutic appointments. If it is possible to identify individual behavioral patterns or general behavioral patterns amongst foster youth, caregivers and professionals could better anticipate periods of difficulty and preventatively provide support, thereby preventing placement disruptions (as described by Chamberlain et al. [8]).

Consider a scenario wherein multiple foster children reside in the same home. On a given day, one child may display aggression toward another child. In turn, this incident may evoke challenging behavior from other foster children in the home, thus increasing both the magnitude of challenging behavior and the response effort required by the caregiver. Future studies should consider evaluating how challenging behavior displayed by one foster child may alter the conditional probability of challenging behavior displayed by other children within the same home. Such evaluations may inform practitioners of how to prioritize multiple cases within the same home and better support caregivers managing dynamic challenging behaviors displayed by multiple foster children in the home.

Another reason caregivers' use of daily behavior ratings is important pertains to prescribers' use of the data to evaluate the effectiveness of pharmacological interventions. As previously noted, Coon et al. [19] found that the daily data collection system used in this study, in conjunction with specific training to increase caregiver advocacy for reducing or changing psychotropic medication following behavior changes, facilitated prescribers' changes in psychotropic medications (either increases or decreases). To this end, days with missed data collection may contribute to more extended use of psychotropic medication as such days do not provide clear evidence of symptom improvement and may also signal a low level of caregiver adherence to interventions. Additionally, other studies have highlighted the importance of collaboration across providers and stakeholders as an especially important characteristic for successful intervention [30, 31]; the data collection process described in this study is one example of facilitating such collaboration. In sum, consistent data collection is an essential component of interdisciplinary treatment that allows various providers to make informed and meaningful treatment decisions.

Some potential limitations of the study should be addressed. First, our analyses were based on a small sample size of individuals from the child welfare system in a limited regional area (i.e., 10 counties within one state). Thus, the extent to which the analyses could identify meaningful patterns for other groups of individuals in other geographical areas is not clear. In addition, results from this study do not necessarily give rise to administrative changes to address group level trends; however, identifying behavioral trends in foster youth could yield insight into changes on a broader, more systemic level. Future studies should continue to evaluate group-level patterns of challenging behavior among children and adolescents in welfare systems using larger sample sizes.

Second, the study did not address several variables that may have affected the extent to which caregivers collected data such as the caregiver's daily routine or the time that the caregiver spent with the child that day. Additionally, the caregivers' data may be biased and influenced based on the severity of behavior on any given day. That is, red days may be reported more often as they may serve as a prompt for the caregiver to record the behavior, whereas green (i.e., easy-to-manage behaviors) days may be reported less, and thereby documented as "missed days," because appropriate child behavior may not serve as a prompt to modify the participant's treatment plan.

Third, our analyses did not account for scheduled visits with biological or new caregivers; such events may deeply affect the emotional and behavioral stability of foster children. Caregivers often provide anecdotal reports of challenging behavior on days surrounding such visitations or when the child transitions back to their biological placement; however, our analyses would not detect these instances unless such visits were on the same day of the week for each youth. To illustrate this possibility, one participant's behavior went from one red day in two months to seven red days in two months *after* he was reunited with his biological mother. Future research should address this question.

Fourth, our analyses did not account for the effect of time receiving treatment services. That is, the conditional probability of red ratings may have decreased over time as the youth received treatment and caregivers received training. To this end, LBAs individualize behavioral interventions to address the severity of the child's challenging behavior and the needs of the foster family. Thus, it is possible the conditional probability of red ratings may decrease throughout the course of treatment. Similarly, as caregivers become more proficient with treatment plans, the conditional probability of missing ratings may decrease over time. Future research should evaluate the extent to which time in treatment impacts both of these variables.

Recently, Edgemon and Rapp [29] expanded the three-color rating system to justice-involved youth in a residential treatment facility and found specific time periods on specific days were most likely to contain challenging behavior by one or more residents. Researchers should further expand the methodology described in this study, Coon et al. [19] and Edgemon and Rapp [29] to evaluate conditional probabilities of behavioral events in residential facilities to inform administrative level decision making and to improve group-level behavioral interventions in these settings.

Acknowledgments

Author Contributions

J. Coon-Robeson obtained ethics approval, coordinated data collection and processing, collected and graphed data, wrote the initial manuscript, and reviewed and revised multiple drafts of the manuscript. A.K. Edgemon conceptualized data analysis, conducted the statistical analyses, wrote the initial manuscript, provided key components of the methods, and reviewed and revised multiple drafts of the manuscript. J. Williamson collected and processed data and wrote the initial manuscript. J.T. Rapp conceptualized and designed the study, obtained ethics approval, coordinated data collection, wrote the initial manuscript, and reviewed and revised multiple drafts of the manuscript. All four authors approve the final manuscript as submitted and agree to be accountable for all aspects of the work.

Funding

Competing Interests

On behalf of all authors, the corresponding author states that there is no conflict of interest.

References

1. Administration for Children and Families. National Data Shows Number of Children in Foster Care Decreases for the Third Consecutive Year [Internet]. Washington, D.C.: Administration for Children and Families; 2021. Available from: https://www.acf.hhs.gov/media/press/2021/national-data-shows-number-children-foster-care-decreases-third-consecutive-year.
2. U.S. Department of Health and Human Services, Administration for Children and Families, Administration on Children, Youth and Families, Children's Bureau. The AFCARS Report [Internet]. Washington, D.C.: U.S. Department of Health and Human Services; 2022. Available from: https://www.acf.hhs.gov/sites/default/files/documents/cb/afcars-report-29.pdf.

3. Hughes K, Bellis MA, Hardcastle KA, Sethi D, Butchart A, Mikton C, et al. The effect of multiple adverse childhood experiences on health: A systematic review and meta-analysis. Lancet Public Health. 2017; 2: e356-e366.

4. Oswald SH, Heil K, Goldbeck L. History of maltreatment and mental health problems in foster children: A review of the literature. J Pediatr Psychol. 2010; 35: 462-472.

5. Greeson JK, Briggs EC, Kisiel CL, Layne CM, Ake GS, Ko SJ, et al. Complex trauma and mental health in children and adolescents placed in foster care. Child Welfare. 2011; 90: 91-108.

6. Leathers SJ, Vande Voort BL, Melka-Kaffer C. Mental health services and psychotropic medications provided to children at risk for placement instability in foster care. Dev Child Welfare. 2021; 3: 256-281.

7. Scozzaro C, Janikowski TP. Mental health diagnosis, medication, treatment and placement milieu of children in foster care. J Child Fam Stud. 2015; 24: 2560-2567.

8. Chamberlain P, Price JM, Reid JB, Landsverk J, Fisher PA, Stoolmiller M. Who disrupts from placement in foster and kinship care? Child Abuse Negl. 2006; 30: 409-424.

9. Jedwab M, Shaw TV. Predictors of reentry into the foster care system: Comparison of children with and without previous removal experience. Child Youth Serv Rev. 2017; 82: 177-184.

10. Brenner SL, Southerland DG, Burns BJ, Wagner HR, Farmer EM. Use of psychotropic medications among youth in treatment foster care. J Child Fam Stud. 2014; 23: 666-674.

11. Raghavan R, Zima BT, Andersen RM, Leibowitz AA, Schuster MA, Landsverk J. Psychotropic medication use in a national probability sample of children in the child welfare system. J Child Adolesc Psychopharmacol. 2005; 15: 97-106.

12. Warner LA, Song NK, Pottick KJ. Outpatient psychotropic medication use in the US: A comparison based on foster care status. J Child Fam Stud. 2014; 23: 652-665.

13. Bush H, Rapp JT, Kierce E. Combining stimulants with antipsychotics for foster children and adolescents: Do prescribers adhere to guidelines? Child Youth Serv Rev. 2021; 121: 105902.

14. Zito JM, Zhu Y, Safer DJ. Psychotropic polypharmacy in the US pediatric population: A methodologic critique and commentary. Front Psychiatry. 2021; 12: 644741.

15. Gupta S, Cahill JD. A prescription for "deprescribing" in psychiatry. Psychiatr Serv. 2016; 67: 904-907.

16. Luna O, Rapp JT, Coon J. Enhancing the lives of foster youth with behavioral interventions. Pediatr Clin. 2020; 67: 437-449.

17. Coon JC, Rapp JT, Ramey E. Reasons why prescribers decrease psychotropic medication for foster youth. Dev Child Welfare. 2021; 3: 345-360.

18. O'Brien C, Rapp JT, Kierce ED. Do prescribers deprescribe psychotropic medication for children in foster care? Dev Child Welfare. 2020; 2: 3-20.

19. Coon JC, Rapp JT, Bush H, Ramey ES. Preliminary findings on the effects of medication advocacy and daily behavior ratings on prescriber behavior. Behav Intervent. 2022; 37: 887-897.

20. Contreras BP, Tate SA, Morris SL, Kahng S. A systematic review of the correspondence between descriptive assessment and functional analysis. J Appl Behav Anal. 2023; 56: 146-165.

21. Herscovitch B, Roscoe EM, Libby ME, Bourret JC, Ahearn WH. A procedure for identifying precursors to problem behavior. J Appl Behav Anal. 2009; 42: 697-702.

22. Borrero CS, Woods JN, Borrero JC, Masler EA, Lesser AD. Descriptive analyses of pediatric food refusal and acceptance. J Appl Behav Anal. 2010; 43: 71-88.

23. Castillo MI, Clark DR, Schaller EA, Donaldson JM, DeLeon IG, Kahng S. Descriptive assessment of problem behavior during transitions of children with intellectual and developmental disabilities. J Appl Behav Anal. 2018; 51: 99-117.
24. Ndoro VW, Hanley GP, Tiger JH, Heal NA. A descriptive assessment of instruction-based interactions in the preschool classroom. J Appl Behav Anal. 2006; 39: 79-90.
25. Kolmogorov AN. Foundations of the theory of probability. New York, NY: Chelsea Publishing Company; 1956. Available from: https://www.york.ac.uk/depts/maths/histstat/kolmogorov_foundations.pdf.
26. Blaine BE. Winsorizing. In: The SAGE encyclopedia of educational research, measurement, and evaluation. Thousand Oaks, CA: SAGE Publications, Inc.; 2018. pp. 1817-1818.
27. Hecke TV. Power study of anova versus Kruskal-Wallis test. J Stat Manage Syst. 2012; 15: 241-247.
28. MacFarland TW, Yates JM. Introduction to nonparametric statistics for the biological sciences using R. Switzerland: Springer Nature; 2016.
29. Edgemon AK, Rapp JT. Conditional probability of challenging behavior in a juvenile justice facility: Analysis by days of week and time of day. Resid Treat Child Youth. 2024; 41: 254-271.
30. Drever S, Tarren-Sweeney M, Nunn K, Jairam R. Helping young people in out-of-home care: Basic elements. J Am Acad Child Adolesc Psychiatry. 2023; 62: 8-11.
31. Malvaso C, Delfabbro P, Hackett L, Mills H. Service approaches to young people with complex needs leaving out-of-home care. Child Care Pract. 2016; 22: 128-147.