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Using SAS® to Examine the relationship between primary caregivers' Adverse Childhood Experiences (ACE) and Child Abuse Allegations

Abbas S. Tavakoli, DrPH, MPH, ME, Kate K. Chappell, MSN, APRN, CPNP-PC, Senna Dejardins, BSn, RN

Abstract

Child maltreatment affected nearly 700,000 children in the United States in 2012. Child maltreatment is broken down into four main divisions according to the Centers for Disease Control (CDC): physical abuse, sexual abuse, emotional abuse, and neglect. South Carolina's ranking for child well-being is among the poorest at 45th in the nation. Earlier recognition and intervention for a child victim of abuse allegations could result in a positive impact on their future health and well-being. The purpose of this paper is using SAS® to examine the relationship between primary caregivers' adverse childhood experiences score and child abuse allegations in the family. Adverse childhood experiences (ACE) scores was used for this study. There were 10 items with possible responses of no or yes. The total scale was created by summing responses for 10 items. The data collection was conducted at the Child Advocacy Center (CAC) of Aiken where families with allegations of child abuse. Each participant completed an ACE score tool and a demographic questionnaire. Proc Mean and Freq used to describe the data. Proc Corr used to examine the linear relationship of total ACE score to ordinal and continuous variables. Proc T-Test, Npar1way, and GLM examine the difference of means for ACE score with selected variables. Male caregiver has slightly higher ACE score 8.28 compare to female 7.75. The average of ACE score was similar by site, race, and marital status. The ACE score was higher for physical abuse compare to other abuse. The result of T-test, nonparametric, and GLM did not reveal any significant difference between ACE score and above variables. All of the P values were greater than .05.

Keywords: SAS, ACE, Children

University of South Carolina, College of Nursing.

Background

Child maltreatment affected nearly 700,000 children in the United States in 2012 (USDHHS, 2012). Child maltreatment is broken down into four main divisions according to the Centers for Disease Control (CDC): physical abuse, sexual abuse, emotional abuse, and neglect (CDC, 2011). Child maltreatment "occurs across socio-economic, religious, cultural, racial, and ethnic groups," (Goldman et al., 2003). Although a singular factor is not identified as the cause of maltreatment, there are a few known categories of risk: caregiver factors, child factors, family factors, and environmental factors (Goldman et al., 2003). This study will focus on caregiver factors by using the Adverse Childhood Experiences (ACE) survey, consisting of ten yes/no questions about potentially difficult or traumatic experiences in childhood, such as abuse of different types, food insecurity, and living with adults with substance abuse issues. South Carolina's ranking for child well-being is among the poorest at 45th in the nation (Children's Trust of South Carolina, 2013). The Child Welfare League of America (2012) reports that, in 2010, 12,191 children were victims of abuse or neglect in South Carolina with 68.3% being neglected, 37.1% physically abused, and 5.5% sexually abused. Identifying relationships between the caregiver's adverse childhood experiences and occurrences of abuse allegations within the current household, has the potential to provide useful information toward understanding the problem and improving wellbeing of children in South Carolina. Earlier recognition and intervention for a child victim of abuse allegations could result in a positive impact on their future health and well-being

Purpose

The purpose of this paper is using SAS® to examine the relationship between primary caregivers' adverse childhood experiences score and child abuse allegations in the family.

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Methodology

Adverse childhood experiences (ACE) scores was used for this study (Anda et al, 2003). There were 10 items with possible responses of no or yes. The total scale was created by summing responses for 10 items. For the Purpose of this study, a primary caregiver will be defined as an adult who has been the primary (or one of the) care Providers for a child with an allegation of maltreatment and who was in this role at least three months prior to its occurrence. Additional inclusion criteria for participants will include being over 18 years old and primarily English speaking. The study was approved through the USC Institutional Review Board for human subject research prior to initiating data collection and was conducted in compliance with all rules, regulations, and training requirements. The data collection was conducted at the Child Advocacy Center (CAC) of Aiken where families with allegations of child abuse are referred for forensic interview, medical exams, and counseling. Signed informed consent was obtained. Each participant completed an ACE score tool and a demographic questionnaire. Once data tools completed, the researcher or a CAC staff member conducted a short, standardized, evidence-based explanation of meaning of ACE score for the participant. A referral list for counseling was provided as indicated. On-site counselors were available for debriefing of any acute distress related to completing a yes/no survey about adverse childhood experiences. The demographic information for caregiver and child were collected. Descriptive statistics will be computed on the variables. For categorical variables, the univariate constructions included frequency distributions. For continuous variables statistics included measure of central tendency (mean and median) and measure of spread (standard deviation and range. Descriptive statistics calculated by categorical variables of interest. In this study the outcome variables is ACE score. T-Test, Npar1way, Pearson & Spearman correlation General Linear Model (GLM) were examined the difference and relationship between ACE score with type of abuse and selected demographic variables.

Data Analysis

Proc Mean and Freq used to describe the data. Proc Corr used to examine the linear relationship of total ACE score to ordinal and continuous variables. Proc T-Test, Npar1way, and GLM examine the difference of means for ACE score with selected variables. All data analyses were performed using **SAS/STAT**® statistical software, version 9.4 (SAS, 2013).

Results

Table1 showed the frequency distribution of selected demographic variables. About 54 percent of sample was from Aiken site. The percentage of female caregiver was 78. About 73 % of sample was white and 40 % were married. The sample showed about 85 % of children was sexual abuse.

Table1. Frequency distribution of selected demographic variables (n=82)

CAC location				
Site	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Aiken	44	53.66	44	53.66
Dickerson	38	46.34	82	100.00

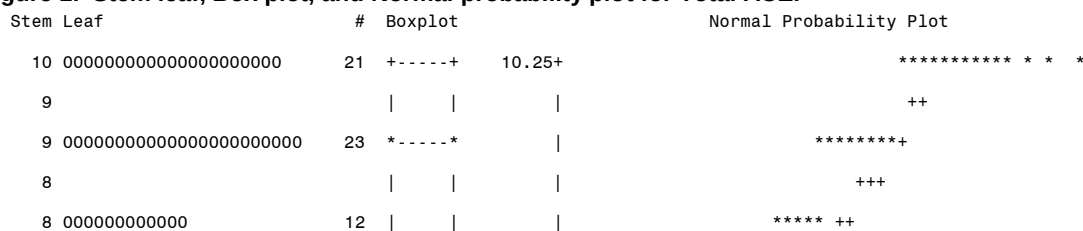
Caregiver gender				
Sex	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Male	18	21.95	18	21.95
Female	64	78.05	82	100.00

Type of abuse for child 1, allegation 1				
tab1g	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Physical Abuse /Neglect	7	8.54	7	8.54
Witness to Violence	5	6.10	12	14.63
Sexual abuse: child-to-child	16	19.51	28	34.15
Sexual: family adult AP	27	32.93	55	67.07
Sexual: outside/teen overage partner	27	32.93	82	100.00

Table2. N, means, standard deviation, minimum, and maximum for variables (n=82).

Label	N	Mean	Std Dev	Minimum	Maximum
Caregiver Age	81	39.74	11.96	23.00	68.00
Age of child 1	82	8.05	4.07	2.00	16.00
Age of child 2	23	8.48	2.94	4.00	16.00
Age of child 3	4	9.50	1.00	8.00	10.00
total ACE scale	82	7.87	2.20	2.00	10.00

Figure 1. Stem leaf, Box plot, and Normal probability plot for Total ACE.



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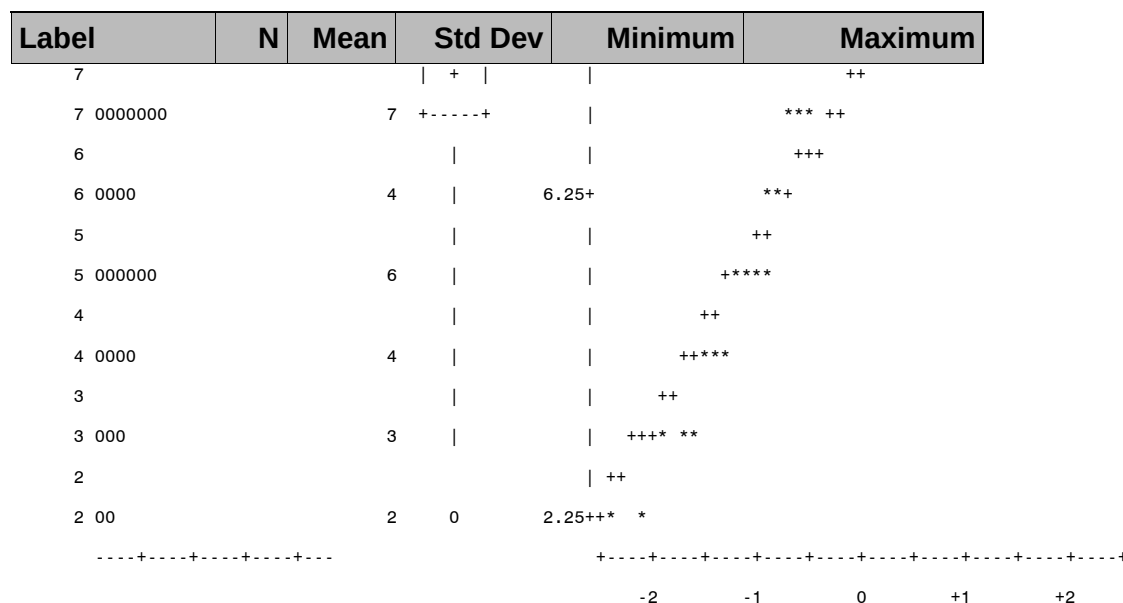


Figure 1 showed stem-leaf, box-plot, and normal probability plot for ACE score. The result indicated the distribution of ACE score is not normal and skewed.

Table 3 indicated Spearman correlation among variables. The results show there is no linear relationship between total viral load and total violence and its subscales. The result indicated that there was weak negative correlation between total violence and its subscales with age. However, the result did not indicate any relationship between number of adults and children living with total violence.

Table3. Pearson and Spearman Correlation ACE score with age caregiver and child ages (n=82).

Pearson Correlation Coefficients Prob > r under H0: Rho=0 Number of Observations				
	Age	AgeC1	AgeC2	AgeC3
tace	0.08635	0.02277	0.10635	0.57735
total ACE scale	0.4434	0.8391	0.6291	0.4226
	81	82	23	4

Spearman Correlation Coefficients Prob > r under H0: Rho=0 Number of Observations				
	Age	AgeC1	AgeC2	AgeC3
tace	0.15341	0.01381	0.10594	0.57735
total ACE scale	0.1715	0.9020	0.6304	0.4226
	81	82	23	4

Table4, N, means, standard deviation, minimum, and maximum for ACE score by selected variables (n=82).

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Analysis Variable : tace total ACE scale						
Caregiver gender	N Obs	N	Mean	Std Dev	Minimum	Maximum
Male	18	18	8.28	2.27	3.00	10.00
Female	64	64	7.75	2.19	2.00	10.00

Analysis Variable : tace total ACE scale						
raceg	N Obs	N	Mean	Std Dev	Minimum	Maximum
White	60	60	7.92	2.23	2.00	10.00
African-American	21	21	7.95	1.94	4.00	10.00

Analysis Variable : tace total ACE scale						
CAC location	N Obs	N	Mean	Std Dev	Minimum	Maximum
Aiken	44	44	7.89	2.16	3.00	10.00
Dickerson	38	38	7.84	2.28	2.00	10.00

Analysis Variable : tace total ACE scale						
Caregiver marital status	N Obs	N	Mean	Std Dev	Minimum	Maximum
Never Married	25	25	7.68	1.97	3.00	10.00
Married	33	33	7.97	2.34	2.00	10.00
divorced/widowed	24	24	7.92	2.32	3.00	10.00

Analysis Variable : tace total ACE scale						
Type of abuse for child 1, allegation 1	N Obs	N	Mean	Std Dev	Minimum	Maximum
Physical Abuse /Neglect	7	7	8.29	2.14	4.00	10.00
Witness to Violence	5	5	6.80	2.59	4.00	10.00
Sexual abuse: child-to-child	16	16	7.69	2.33	2.00	10.00
Sexual :family adult AP	27	27	7.96	2.31	2.00	10.00
Sexual: outside/teen overage partner	27	27	7.96	2.07	3.00	10.00

Table 4 indicated means, standard deviation, and range of ACE score by selected variables. Male caregiver has slightly higher ACE score 8.28 compare to female 7.75. The average of ACE score was similar by site, race, and marital status. The ACE score was higher for physical abuse compare to other abuse. The result of T-test, nonparametric, and GLM did not reveal any significant difference between ACE score and above variables. All of the P values were greater than .05.

Conclusion

Using SAS® to Examining the relationship between primary caregivers' Adverse Childhood Experiences (ACE) and Child

We used SAS® to examine the relationship between primary caregivers' adverse childhood experiences score and child abuse allegations in the family. Proc Mean and Freq used to describe the data. Proc Corr used to examine the linear relationship of total ACE score to ordinal and continuous variables. Proc T-Test, Npar1way, and GLM examine the difference of means for ACE score with selected variables. The result of T-test, nonparametric, and GLM did not reveal any significant difference between ACE score and above variables. All of the P values were greater than .05. SAS is power tool to assist clinician to analysis data in any levels. In this study simple procedures in SAS help clinician to examine and evaluate her/his question

REFERENCES

- Anda, R. F., Felitti, V. J., and Redding, C. (2003). Origins and essence of the study. *Ace reporter Newsletter*. Retrieved from http://acestudy.org/yahoo_site_admin/assets/docs/ARV1N1.127150541.pdf
- Centers for Disease Control. (2011, July). *Child maltreatment prevention*. Retrieved from <http://www.cdc.gov/ViolencePrevention/childmaltreatment/index.html>
- Child Welfare League of America. (2012). *South Carolina's children 2012*. Retrieved from <http://www.cwla.org/advocacy/statefactsheets/2012/southcarolina.pdf>
- Children's Trust of South Carolina. (2013). *2013 Kids Count data book*. Retrieved from https://scchildren.org/advocacy_and_media/kids_count_south_carolina/2013_kids_count_data_book/
- Goldman, J., Salus, M. K., Wolcott, D., & Kennedy, K. Y. (2003). *A coordinated response to child abuse and neglect: The foundation for practice*. Retrieved from <https://www.childwelfare.gov/pubs/usermanuals/foundation/foundatione.cfm>
- U. S. Department of Health & Human Services. (2012). *Child maltreatment 2012*. Retrieved from <http://www.acf.hhs.gov/sites/default/files/cb/cm2012.pdf#page=20>
- SAS Institute Incorporated. (2013). *SAS for Windows 9.4*. Cary, NC: SAS Institute Inc.

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Contact Information

Abbas S. Tavakoli, DrPH, MPH, ME
 Clinical Associate Professor/ Director of Statistical Lab
 College of Nursing
 University of South Carolina
 1601 Greene Street
 Columbia, SC 29208-4001
 Fax: (803) 777-5561
 E-mail: abbas.tavakoli@sc.edu

SAS Syntax

Part of Data steps:

```
proc format;
  Value sexf 0="Male"
              1="Female";
  Value sitef 0="Aiken"
              1="Dickerson" ;

  Value Tab1gf 1="Physical Abuse /Neglect"
                2="Witness to Violence"
                3="Sexual abuse: child-to-child"
                4="Sexual:family adult AP"
                5="Sexual: outside/teen overage partner" ;
```

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```

value racef 0 ="White"
           1="African-American"      ;

value martgf 1="Never Married"
            2="Married"
            3="divorced/widowed";

data one;
set ace.acedata;
LABEL
site= "CAC location"
Medicaid= "Medicaid"
TabC1a1="Type of abuse for child 1, allegation 1"
TabC1a2="Type of abuse for child 1, allegation 2"
TabC1a3= "Type of abuse for child 1, allegation 3"
TabC2a1= "Type of abuse for child 2, allegation 1"
TabC2a2= "Type of abuse for child 2, allegation 2"
TabC3a1="Type of abuse for child 3, allegation 1"
id="Participant Number"
age= "Caregiver Age"
sex = "Caregiver gender"
race ="Caregiver race"
ethnic= "caregiver ethnicity"
MarT= "Caregiver marital status"
AgeC1= "Age of child 1"
AgeC2="Age of child 2"
AgeC3="Age of child 3"
SexC1="Gender of child 1"
SexC2="Gender of child 2"
SexC3="Gender of child 3"
Rel="Relationship of caregiver to child"
ACE1= "swear, insult, humiliate you, or act to make youa fraid of physical hurt"
ACE2= "push, grab, slap, hit you so hard you had marks/injured you"
ACE3= "touch fondle, attempt oral, anal, vaginal intercourse with you"
ACE4= "feel no one loved you or family didn't feel close/support eachother"
ACE5= "didn't have enough to eat, wear dirty clothes, parents drunk/high"
ACE6= "parents ever seperated or divorced"
ACE7= "your mom/stepmom ever pushed, grabbed, kicked, threatened with gun/knife"
ACE8= "live with problem drinker/alcoholic/drugs"
ACE9="household member depressed/mentally ill/suicide attempt"
ACE10= "household member go to prison"
Tyes= "Ace score, number of yes answers"
Tno="Number of no answers"
;

format sex sexc1 sexc2 sexc3 sexf. race racef. ethnic ethnicf. mart martf. rel relf.
TabC1a1 TabC1a2 TabC1a3 TabC2a1 TabC2a2 TabC3a1 TabC1a1f. medicaid medf. ace1-ace10 ace1f. site
sitef. ;
run;

data two;
set one;

if TabC1a1=0 or TabC1a1=1 then tab1g=1;
  else if TabC1a1= 2 then tab1g=2;
  else if tabc1a1=3 then tab1g=3;
  else if tabc1a1=4 then tab1g=4;
  else if tabc1a1=5 or tabc1a1=6 then tab1g=5;

if mart =0 then martg=1;
  else if mart=1 then martg=2;

```

Using SAS® to Examining the relationship between primary caregivers' Adverse Childhood Experiences (ACE) and Child

```

else if mart=2 or mart=3 then martg=3;

if race = 0 then raceg=0;
else if race= 1 then raceg=1;
tace = sum (of ace1-ace10);

Label
Tace ="total ACE scale"
Tab1g="Type of abuse for child 1, allegation 1"
MarTg= "Caregiver marital status"
MarTgb= "Caregiver marital status";

format tab1g tab1gf. martg martgf. martgb martgbf. raceg racef.;
run;

```

Procedures:

```

ods rtf; ods listing close;

proc freq data =two;
tables tabc1a1 tab1g tace raceg martg sex site;
title ' Frequency tables / ' ; run;

proc means data=two maxdec=2;
var age agec1 agec2 agec3 tace ;
TITLE1 'Mean'; run;

proc univariate data=two plot normal ;
var tace ;
TITLE1 'Univariate'; run;
ods rtf close; ods listing; quit; run;

ods rtf; ods listing close;

proc corr data=two pearson spearman ;
var age agec1 agec2 agec3 ; with tace;
TITLE1 'Correlation'; run;

ods rtf close; ods listing; quit; run;

ods rtf; ods listing close;

%macro avg (q);
proc means data=two maxdec=2;
class &q; var tace
;
TITLE1 'Mean'; run;
%mend avg;

%avg ( sex); %avg ( raceg); %avg (site); %avg (martg); %avg (tab1g); run;

ods rtf close; ods listing; quit; run;

ods rtf; ods listing close;

%macro ttest (q);
proc ttest data=two ;
class &q; var tace ;
TITLE1 'ttest'; run;
%mend ttest;

```

Using SAS® to Examining the relationship between primary caregivers' Adverse Childhood Experiences (ACE) and Child

```
%ttest ( sex); %ttest ( raceg); %ttest (site); run;
```

```
%macro nonpar (q);  
proc npar1way data=two ;  
    class &q;    var tace    ;  
    TITLE1 'ttest';    run;  
%mend nonpar;
```

```
%nonpar (sex); %nonpar (raceg); %nonpar (site); %nonpar (martg) ; %nonpar (tab1g);  
run;
```

```
%macro glm (d,i,t);  
proc glm data=two;  
class &i;    model &d = &i ; lsmeans &i / adjust=tukey ;  
    title ' GLM model' &t; run;  
%mend glm;
```

```
%glm (tace,tab1g, ACE ); %glm (tace,martg, ACE ); run;  
ods rtf close; ods listing; quit; run;
```