

SAS[®] GLOBAL FORUM 2019

USERS PROGRAM

APRIL 28 - MAY 1, 2019 | DALLAS, TX





Parents in Prison: Correspondence Analysis (CA) for criminal justice phenomena

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Abstract

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Abstract

Across America, prisons hold the parents of over a million children (Bureau of Justice Statistics, 2008). Nationally, prisons held approximately 744,200 fathers and 65,600 mothers (Glaze & Maruschak, 2008). Archival data (*Survey of Inmates in State and Federal Correctional Facilities, 2004*; *Survey Of Prison Inmates (SPI), 2016*) was utilized to conduct a correspondence analysis inquiry regarding inmates and their minor children. Correspondence analysis (CA) shows how data deviate from expectation (observed values versus expected values) when the row and column variables are independent (Benzecri, 1992, Friendly, 1991; Dickinson & Hall, 2008).

Correspondence analysis creates a two-dimensional visual display of observed data variation, which can be utilized for examination of variable behaviors (Wheater et al, 2003). SAS[®] code was written to invoke the CORRESP procedure. Variables of interest included self-reported gender, ethnicity, percentages of minor children, and their associated caregivers. Caregiver refers to the person responsible for the minor child while the parent was incarcerated – the non-incarcerated parent, grandparents, other relatives, and foster care. The resultant CA output includes a table of associated values and the CA graphical displays generated. This presentation highlights SAS versatility to investigate social phenomena variables within large federal datasets, and generates empirical inquiry to visualize the social magnitude of parents in prison.

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Introduction

“With growing public attention to the problem of mass incarceration; in 2018, over 200,000 women and men were held in prisons, jails, and other correctional facilities in the United States. This is especially troubling given that 80% of women in jails are mothers, and most of them are primary caretakers of their children” (Kajstura, 2018). For 2016 reported data, males (377 per 100,000 male U.S. residents) were incarcerated at a rate six times that of females (62 per 100,000 female U.S. residents); with Non-Hispanic blacks (599 per 100,000 black U.S. residents) having the highest jail incarceration rate at year-end 2016; “among non-Hispanics in 2016, blacks were incarcerated in jail at a rate 3.5 times that of whites” (BJS, 2016, p.3). This study highlights the United States incarceration data, and the minor children impacted by their parent’s incarceration.

Objective

The objective of this work is to utilize empirical, federal data to investigate the criminal justice phenomena of inmates and their minor children, thus highlighting the subsequent associations of the minor children and their resultant caregivers.

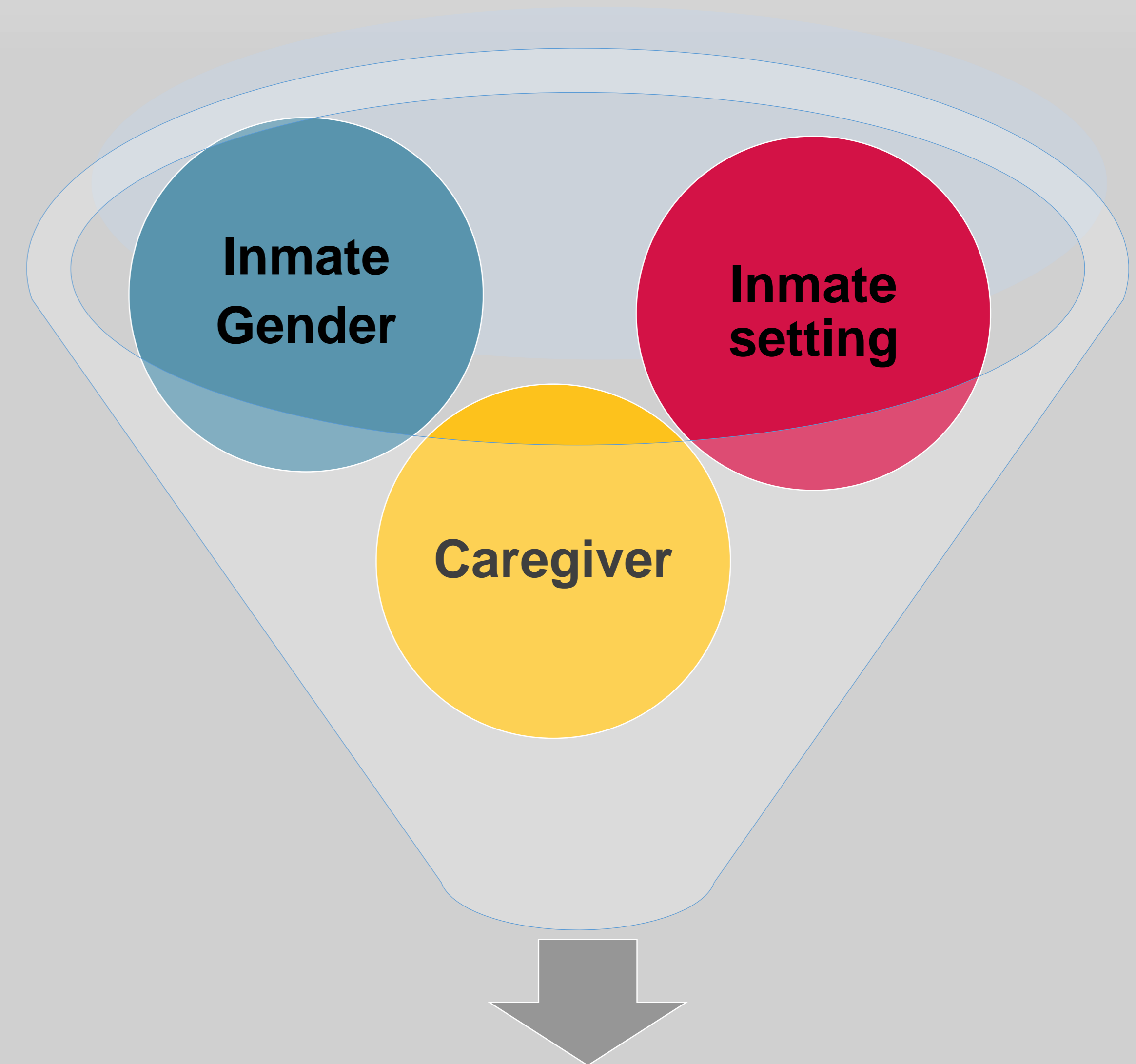
Data Sources

Survey of Inmates in State and Federal Correctional Facilities (SISFCF), 2004

Survey Of Prison Inmates (SPI), 2016

Survey of Prison Inmates (SPI) is a periodic, cross-sectional survey of the state and federal prison populations. Its primary objective is to “produce national statistics of the state and sentenced federal prison populations across a variety of domains”, such as demographic characteristics, current offense and sentence, incident characteristics, firearm possession and sources, criminal history, socioeconomic characteristics, family background, drug and alcohol use and treatment, mental and physical health and treatment, and facility programs and rule violations”. Previous versions of the SPI were known as the “Survey of Inmates in State and Federal Correctional Facilities (SISFCF)”. The 2016 SPI data was collected through face-to-face interviews with prisoners using computer-assisted personal interviewing (CAPI)”.

Source: Bureau of Justice Statistics, <https://www.bjs.gov/index.cfm?ty=dcdetail&iid=488>



Categorical variables for inclusion

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Correspondence analysis: Measuring departures from independence

Like many multivariate techniques, the aim of correspondence analysis is “to determine scores which describe how similar or different the responses from two or more variables are” (Beh & Lombardo, 2014. p. 122). In this work, we examined the relationship between inmate gender and caregiver of minor children, and examined the relationships of inmate ethnicity and age.

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Variables for investigation

Study variable	SAS variable	Type of variable	Levels of variable
Inmate gender	igender	Categorical	1 = male 2= female
Inmate ethnicity	lethnicity	Categorical	1 = Black 2= White 3= Hispanic/Latino 4= Native American 5= Asian
Caregiver of minor child/children	caregiver	Categorical	1= other parent 2 = grandparent 3 = other relatives 4 = foster care 5 = friends
Inmate setting	itype	Categorical	1 = state prison 2 = federal prison

United States Federal prisons map

Source:

https://www.justice.gov/jmd/mps/manual/maps/bop_large.jpg





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CA graphical output: Caregiver by inmate gender

Findings

Major findings included the empirical confirmation of caregiver attributes. For female inmates, the most likely caregiver was the grandparent of their minor child/children. For male inmates, the most likely caregiver was the other parent (mother). For the dataset, numbers may total to more than 100 percent, due to inmates who may have multiple children, with differing caregiver circumstances. A unique distinction of this work is the visual displays of inmate gender and associated caregiver of the minor child/children. While many studies have provided tables and bar graphs displaying these values, the correspondence analysis graphical output shows the strong relationships of the categorical variables within the dataset.

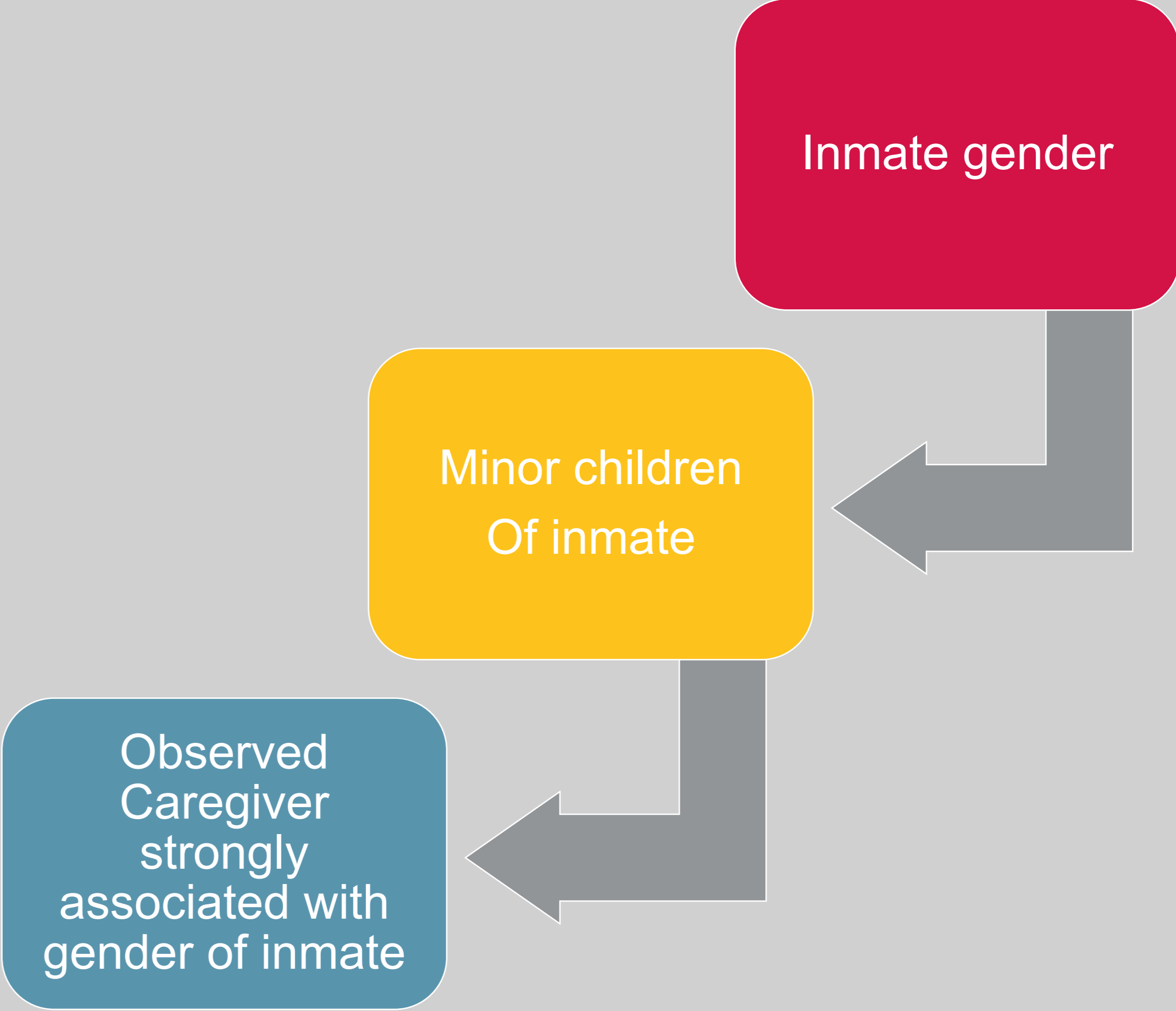
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Correspondence Analysis: Inertia and Ch-Square Decomposition

Inertia
Within correspondence analysis, the concept of inertia is analogous to the concept of variance in PCA, and it is proportional to the chi-square information" (SAS Institute, 2008, p.1320).

Total Chi-Square Statistic
The total chi-square statistic describes the measure of the association between the rows and the columns, and is disaggregated by each of the dimensions.

Decomposition
This decomposition shows the percent contribution each dimension makes to the explanation of the relationship between the variables.



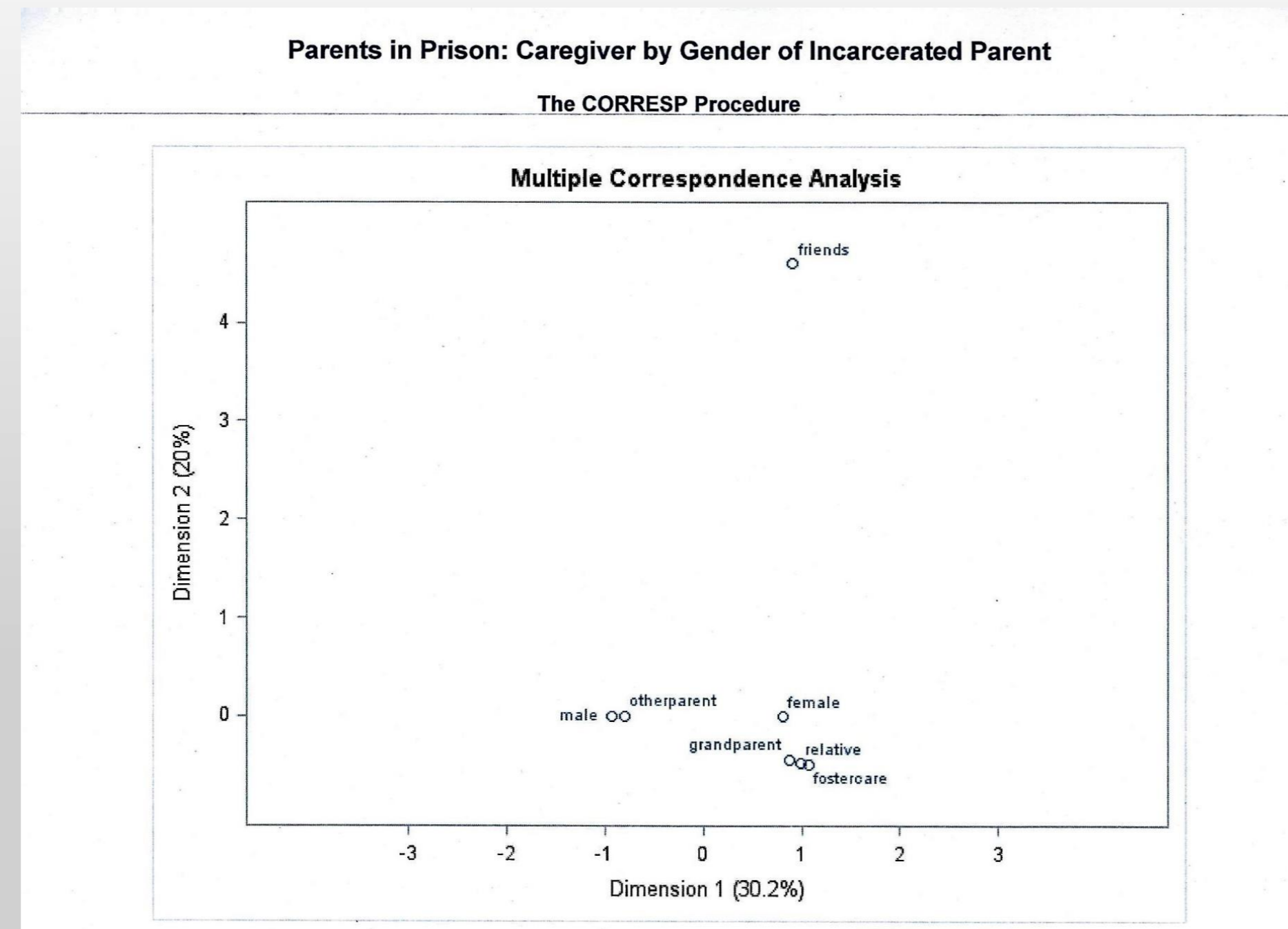


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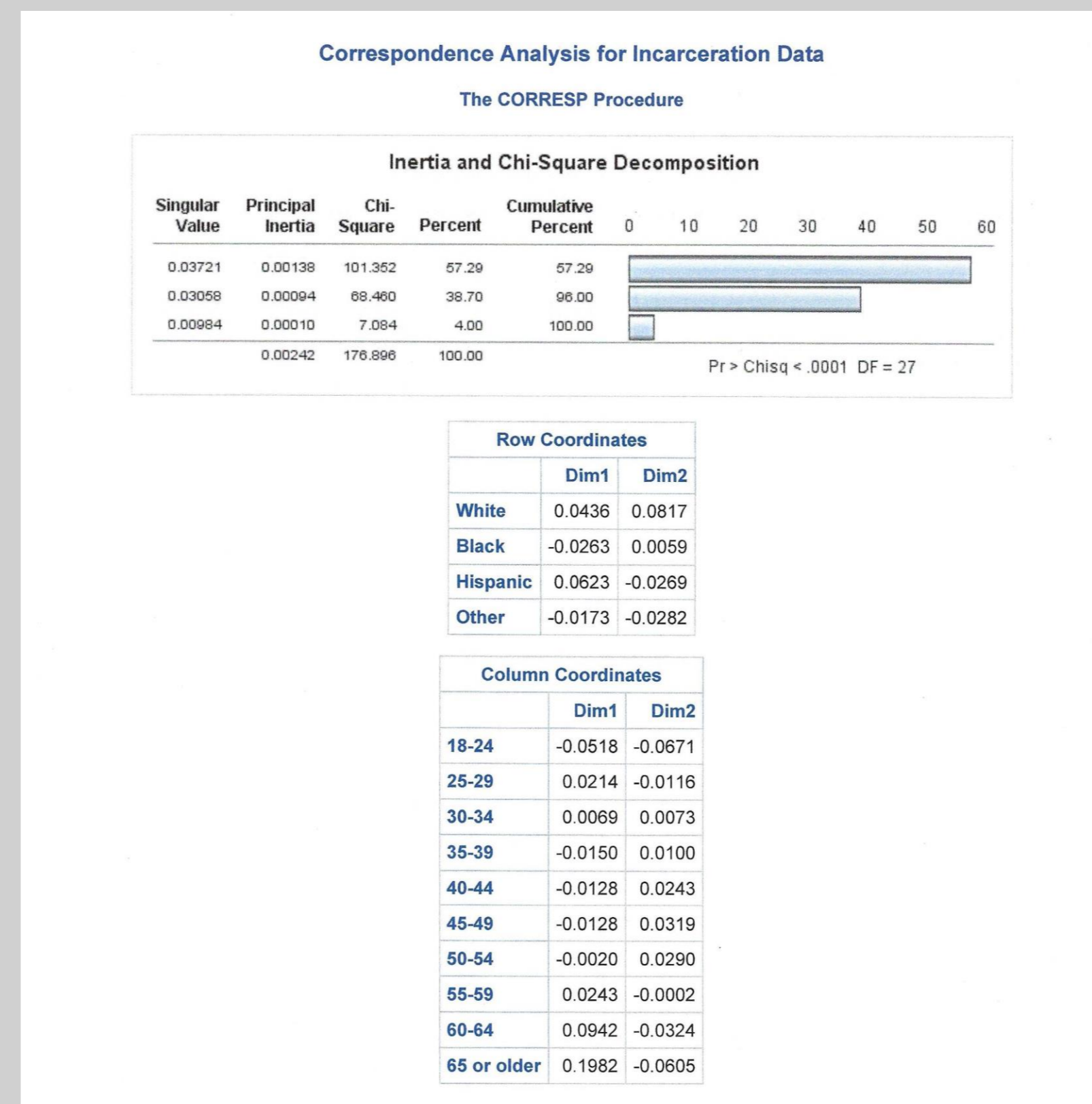
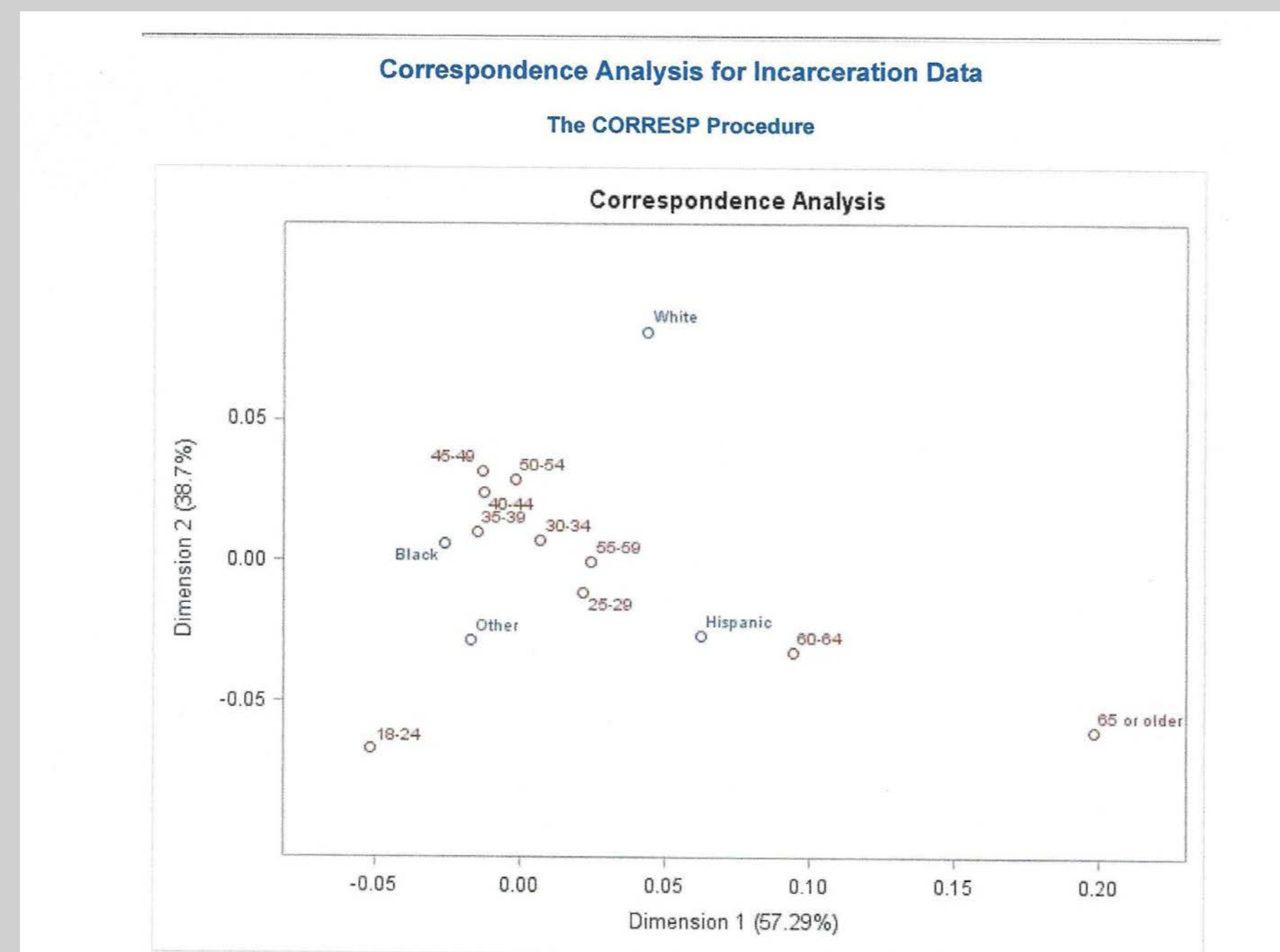
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CA: Caregiver by Inmate Gender



CA: Inmates by Ethnicity



Discussion

Correlation approaches provide the basis for all classical multivariate techniques (Friendly, 2002). Complex social phenomena require examination of multiple complex variables. Oftentimes, these variables are categorical in nature. Merely dichotomizing or dummy coding these variables diminishes their explanatory and predictive value. Hill (1974) has described correspondence analysis (CA) as a “neglected multivariate method”. CA utilizes contingency table analysis to detect relationships between the underlying categorical variables. For the graphical outputs, CA depicts the variable relationships in a spatial grid, with 2-dimensional representation of the row and column variables as defined by the underlying dataset.

For the first analysis, the gender of the incarcerated parent was compared with the gender of the associated caregiver status of their minor child/children. For incarcerated female parents, the most associated caregiver was the grandparent. For incarcerated male parents, the most associated caregiver was the other parent (mother of minor child/children).

For the second analysis, the ethnicity of the incarcerated person was compared with their reported age. This enabled the creation of the resultant graphical output, which displays the relationship between inmate ethnicity and age. The plot shows that ethnicities of “black” and “other” are associated with multiple inmate age ranges, and greater frequencies of incarcerated inmates. There are fewer inmates reported in the 18-24 years of age, and the 65 or older age group categories. Most prominently, reported inmate ethnicity by age group is predominately “black” or “other”. This is shown by the “white” ethnicity and race being further away, visually, from the age group categories.

Cook and Wainer (2013) described plotting evidence to affect social policy. By utilizing incarceration datasets, harnessed with the power of SAS, we have created visualizations of the present-day incarceration phenomena in the United States.





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