Contents

Preface XV

Chapter I: The Study of Statistics		
in Criminal Justice	1	
Learning Objectives	1	
Introduction	1	
What Are Statistics?	2	
Quantitative Raw Data or		
Compilations of		
Nonquantitative		
Raw Data as Statistics	3	
The Results of		
Mathematical		
Calculations as Statistics	4	
The Application of		
Probability Theory as		
Statistics	4	
Where Do Statistics Come From?	5	
Categorizing and Counting	5	
Measuring	5	
Applying Probability		
Theory	6	
How Are Statistics Used in		
Criminal Justice?	6	
Description	6	
Estimation	7	
Explanation	7	
Prediction	8	
Major Sources of Statistical		
Data in Criminal Justice	8	
Why Study Statistics?	9	
The Sometimes Contrasting		
Views of Researchers		
and Practitioners About		
Quantitative Research	9	

and Statistical Analysis	21	
Chapter 2: Scientific Research		
Questions	19	
Exercises and Discussion		
Review Questions	18	
Concepts to Master	18	
Summary	17	
This Course	15	
Tips for Succeeding in		
and Practices	13	
Justice Agency Policies		
for Improving Criminal		
Statistics-Based Initiatives		
Criminal Justice Careers	12	
Professionalization of		

21

and Statistical Analysis	4 1
Learning Objectives	21
Introduction	22
Units of Analysis and Variables	22
Mutually Exclusive and	
Exhaustive Variable Values	23
Discrete and Continuous	
Variable Values	23
Levels of Measurement	24
Nominal-Level	
Measurements	24
Ordinal-Level	
Measurements	24
Interval-Level	
Measurements	25
Ratio-Level Measurements	26
Some Additional	
Considerations	
Regarding Levels of	
Measurement	26

Hypotheses	27
Hypotheses as Proposed	
Causal Explanations	27
Research Hypotheses and	
Null Hypotheses	29
The Conditions for	
Causality	30
Sampling	32
Simple Random Sampling	33
Research Design	34
Before-After Design	34
Before-After With	
Control Group Design	35
Quasi-Experimental	
Research Designs	38
Ethical Integrity in Data Analysis	38
Plagiarism	39
Due Diligence in Data	
Management and	
Analysis	39
Garbage In-Garbage Out	40
Summary	40
Concepts to Master	41
Review Questions	41
Exercises and Discussion	
Questions	43
Chapter 3: Basic Descriptive	
Univariate Analysis	45
Learning Objectives	45
Introduction	46
Some Basic Types of Statistical	
Analysis	46
Univariate, Bivariate, and	
Multivariate Statistics	46
Descriptive and Inferential	
Statistics	47
Univariate Descriptive Analysis	47
Frequency Counts	48
Ratios, Fractions,	
Proportions, and	
Decimals	48
Percents	49
Rates	51
Odds	53

Creating Data Distributions	53
Frequency Distribution	
Tables	53
Frequency Distribution	
Bar and Line Graphs	55
Percent Distribution	
Tables and Graphs	63
Cumulative Distributions	67
More About Graphs	71
The Power of Graphs	72
Some Additional Kinds of	
Graphs	73
Titling and Labeling Tables	
and Graphs	80
Cautions With Graphs	80
Summary	87
Concepts to Master	87
Review Questions	88
Exercises and Discussion	
Questions	89
Chapter 4: Describing Univariate	
Distributions	93
Learning Objectives	03
Introduction	93
Different Distribution Shapes	94
Character and Vertexia	0.4
Boll Shanad and Normal	94
Distributions	0.4
Distributions	94

Learning Objectives	93
Introduction	94
Different Distribution Shapes,	
Skewness, and Kurtosis	94
Bell-Shaped and Normal	
Distributions	94
Skewness	96
Kurtosis	97
Measures of Central Tendency	97
Mean	97
Median	99
Mode	102
Collapsing Variable Values	103
Finding a Mode, Median,	
and Mean for	
Distributions of	
Grouped Scores	105
Selecting Appropriate	
Measures of Central	
Tendency	108
Measures of Dispersion	112
Range	112

Average Deviation	112
Variance and Standard	
Deviation	113
Selecting Appropriate	
Measures of Dispersion	117
A Special Property of the Mean	118
Measures of Location in a	
Distribution	120
Quartile, Decile, and	
Percentile Analyses	120
Selecting Appropriate	
Measures of Location	123
Dealing With Missing Data	124
Some Other Cautions in the	
Uses and Interpretations of	
Univariate Descriptive Statistics	125
Summary	128
Concepts to Master	128
Review Questions	128
Exercises and Discussion	
Questions	129

Chapter 5: Distributions: Normal

and Otherwise

Learning Objectives	133
Introduction	133
Proportional Area Graphs	134
Normal Distributions and	
Normal Curves Revisited	140
The Special Characteristics of	
the Theoretical Normal Curve	140
Means, Standard Deviations	,
and Areas Under the	
Normal Curve	141
The Theoretical Standard	
Normal Curve and <i>z</i> Scores	144
The <i>z</i> -Score Table	150
Using the <i>z</i> -Score Table	150
A Note About Tests for	
Normality	160
Summary	161
Concepts to Master	162
Review Questions	162
Exercises and Discussion	
Questions	163

133

Chapter 6: An Introduction to	
Probability Theory and	
Probability Distributions	167
Learning Objectives	167
Introduction	168
Probability Theory	168
Some Rules of Probability	
Theory	169
Rules for Outcomes of	
a Single Trial	170
Independent and	
Dependent Events	172
Rules for Outcomes of	
Multiple Trials	173
Probability Distributions	176
Binomial Distributions	
and Binomial Probability	
Distributions	177
Normal Curve	
Approximations of	
Binomial Probability	
Distributions	180
Some Concluding	
Comments About	
Binomial Distributions	184
Probabilities and Random	
Sampling	184
Summary	185
Concepts to Master	185
Review Questions	185
Exercises and Discussion	
Questions	186

Chapter 7: Univariate Inferential Statistics: Sampling Distributions and Population Parameter

Estimation	189
Learning Objectives	189
Introduction	190
Sampling Distributions and	
Their Role in Inferential	
Statistics	191
A Simple Illustration:	
Who'll Buy the Coffee?	192

Constructing a Sampling	
Distribution Empirically	193
Describing Sampling	
Distributions: Means and	
Standard Errors	196
Constructing Sampling	
Distributions Mathematically	197
Binomial Distributions as	
Sampling Distributions	197
Point and Interval Estimates of	
Population Means	202
Sampling Distributions for	
Sample Means	204
Two Provisions of the	
Central Limit Theorem	205
Point Estimates of	
Population Means	205
Interval Estimates of	
Population Means	206
Estimating Population	
Proportions Revisited	217
Parametric and Nonparametric	
Inferential Statistics	221
Assumptions and Cautions	221
Summary	222
Concepts to Master	223
Review Questions	223
Exercises and Discussion	
Questions	224
Chapter 8: Bivariate Hypothesis	
Testing With Nominal and	
Ordinal Variables	227
Learning Objectives	227
Introduction	228
Some Basics of Hypothesis	
Testing	228
Type I and Type II Errors	230
Comparing Frequency	
Distributions	231
Both Variables at the	
Nominal Level	232
One Variable at the	
Nominal Level and One	

Variable at the Ordinal	
Level	234
Both Variables at the	
Ordinal Level	236
Fundamentals of Cross-	
Tabulation	236
Constructing a	
Contingency Table	236
Titling and Labeling the	
Contingency Table	239
Collapsing Categories	240
Using Percents in	
Contingency Tables	242
Reading the Diagonals in	
Contingency Tables	243
Elaboration Analysis	245
Replication	248
Explanation	249
Interpretation	249
Specification	250
No Apparent Relationship	
in the Zero-Order Table	251
Some Examples of	
Elaboration Analysis	251
Chi-Square Analysis	258
Assumptions	258
The Basic Ideas Underlying	
Chi-Square Analysis for	
Contingency Tables	259
Calculating Expected Cell	
Frequencies	261
Calculating Chi Square	264
Using the Chi-Square Table	265
Statistical Significance and	
Rejection Regions	266
Chi Square as a Univariate	
Goodness-of-Fit Test	268
How to Present Results	268
Assumptions and Cautions	270
Summary	272
Concepts to Master	273
Review Questions	273
Exercises and Discussion	
Questions	275

Chapter 9: Bivariate Hypothesis Testing for the Difference

Between Two Means	279
Learning Objectives	279
Introduction	280
Independent and Dependent	
Random Samples	282
Independence and	
Dependence Within a	
Random Sample	282
Independence and	
Dependence Between	
Random Samples	282
A <i>t</i> Test for the Difference	
Between Two Independent	
Random Sample Means	285
Assumptions and	
Hypotheses	286
Directional and	
Nondirectional	
Hypotheses	287
Heteroscedasticity and	
Homoscedasticity	287
The Basic Ideas	
Underlying the	
Independent Random	
Samples Version of the	
t Test	289
The Theoretical Formulas	
for the Independent	
Random Samples	
Version of the <i>t</i> Test	291
The Sampling Distributions	
for the Difference	
Between Two	
Independent Random	
Sample Means	293
Calculating <i>t</i> for the	
Independent Random	
Samples Version of the	
<i>t</i> Test	298
Testing <i>t</i> for Statistical	•••
Significance	298

One- and Two-Tailed Tests	
of Significance	301
Some Reflections on Statistical	
Significance Tests	305
A <i>t</i> Test for the Difference	
Between Two Dependent	
Random Sample Means	306
Assumptions and	
Hypotheses	308
The Basic Ideas Underlying	
the Dependent Random	
Samples Version of	
the t Test	309
The Theoretical Formula	
for the Dependent	
Random Samples	
Version of the <i>t</i> Test	310
The Sampling Distribution	
for \overline{D}	311
Calculating <i>t</i> for the	
Dependent Random	
Samples Version of	
the <i>t</i> Test	313
Calculating Degrees of	
Freedom	313
Interpreting the Results	314
Presenting Results for	
t Tests	314
The Relationship Between t and z	316
Confidence Limits and Intervals	
for the Difference Between	
Means	316
Assumptions and Cautions	318
Summary	320
Concepts to Master	321
Review Questions	321
Exercises and Discussion	
Questions	322

Chapter 10: Bivariate Hypothesis	
Testing With One-Way	
Analysis of Variance	325
Learning Objectives	325

Introduction	326
Analysis of Variance (One-Way)	327
Assumptions and	
Hypotheses	327
The Basic Ideas Underlying	
ANOVA	331
The Theoretical ANOVA	
Test Statistic F	337
Estimating Population	
Variances	338
Calculating the Population	
Variance Estimates	338
Calculating F	345
The Sampling	
Distributions for F	346
Using the F Tables	347
Presenting ANOVA Results	347
Follow-Up Analysis After a	
Significant F	348
Tukey's HSD Test	349
The Relationship Between	
F and t	352
Assumptions and Cautions	352
Summary	352
Concepts to Master	353
Review Questions	353
Exercises and Discussion	
Questions	354
Chapter : Bivariate Linear	
Regression and Correlation	
and Linear Partial Regression	
and Correlation	357
Learning Objectives	357
Introduction	358
The Basic Ideas Underlying	550
Linear Correlation and	
(Regression) Analyses	350
Scattergrams	360
Linear Bivariate Regression	500
Analycic	365
Calculating the Best Eitting	505
(Regression) Line	
Constants a and h	368
Constants <i>u</i> and <i>b</i>	300

Linear and Nonlinear	
Relationships	376
Standardized Betas	378
Cautions With Predictions	
From Linear Regression	
Equations	379
Linear Bivariate Correlation	
Analysis	379
Correlation Matrixes	383
The Problem of Outliers	383
Comparing r and b	386
The Coefficient of $D_{atomic instance} x^2$	200
Determination r	388
Constants $(a \text{ and } b)$ for	
a Best Fitting Line	390
Other Statistical Measures	570
of Strength of	
Relationship	393
Correlation and Cross-Tabulation	393
Test of Statistical Significance for	
<i>r</i> and <i>b</i>	395
Linear Partial Regression and	
Correlation Analysis	397
Calculating $r_{xy,T}$	398
Assumptions and Cautions	400
Summary	401
Concepts to Master	402
Review Questions	402
Exercises and Discussion	
Questions	404
Chapter 12: Multivariate Linear	
Regression and Correlation	
Analysis and Logistic	
Regression: An Introduction	407
Learning Objectives	407
Introduction	408

Dealing With Missing Data	411
Assumptions of Linear Multiple	
Regression and Correlation	
Analyses	413
Linear Multiple Regression	
Analysis	413
The Basic Ideas	
Underlying Linear	
Multiple Regession	
Analysis	414
The General Linear	
Multiple Regression	
Equation	418
Standardized Betas	420
Stepwise Regression	421
Linear Multiple Correlation	422
The Basic Ideas Underlying	
Linear Multiple	
Correlation Analysis	422
Dummy Variables in Multiple	
Regression and Correlation	
Analyses	423
Models	425
Main Effects and Interaction	
Effects	427
The Problem of	
Multicollinearity	429
Tests of Statistical Significance	
for Linear Multiple Regression	
and Correlation Analyses	430
Reporting the Results of	
Multiple Regression and	
Correlation Analyses	430
Logarithm-Based Analyses	436
Logistic Regression	437
Reporting the Results of	
Logistic Regression	448
Assumptions and Cautions	454
Summary	455
Concepts to Master	456
Review Questions	456
Exercises and Discussion	
Questions	458

Statistics	46 I
Learning Objectives	461
Introduction	462
Choosing Between Parametric	
and Nonparametric	
Inferential Statistics	
Revisited	462
General Assumptions of	
Nonparametric Inferential	
Statistics	464
The Mann-Whitney U Test for	
Two Independent Random	
Samples	465
Asssumptions of the	
M-WUTest	465
The Basic Ideas Underlying	
the M-W U Test	465
Preparing Data for	
M-W U Analysis	466
Calculating M-W U	471
The Sampling Distribution	
for U	475
Testing <i>U</i> for Statistical	
Significance	476
Reporting the Results of	
M-WUAnalysis	479
Concluding Remarks	
Regarding M-W U	
Analysis	479
The Kruskal-Wallis <i>H</i> Test for	
Three or More Independent	
Random Samples	479
Assumptions of the	
K-Ŵ <i>H</i> Test	488
The Basic Ideas	
Underlying	
the K-W <i>H</i> Test	488
Preparing Data for K-W H	
Analysis	489
Calculating K-W H	492
Testing K-W <i>H</i> for	
Statistical Significance	494

Chapter 13: Nonparametric

Reporting the Results of	
K-W <i>H</i> Analysis	495
Concluding Remarks	
About K-W H	
Analysis	495
Spearman's ρ Analysis	498
Assumptions of	
Spearman's ρ Analysis	499
The Basic Ideas	
Underlying	
Spearman's	
ρ Analysis	499
Preparing Data for	
Spearman's p	
Analysis	500
Calculating Spearman's p	502
Testing ρ for Statistical	
Significance	503
Reporting the Results of	
ρ Analysis	504
Concluding Remarks	
Regarding Spearman's	
ρ Analysis	504
Some Final Cautions About	
Nonparametric Statistics	510
Summary	511
Concepts to Master	512
Review Questions	512
Exercises and Discussion	
Questions	513

Chapter 14: Real-Life Adventures of Statistics Users 517 Statistics: A Practitioner's View 517 By John H. Schlaf, Director of Campus Safety, Knox College, and Former Chief of Police, Galesburg, Illinois Statistics: A Researcher's View 529 By Jerry Fitzgerald, Former Alcohol and Drug Abuse Researcher, Department of Psychiatry, University of Iowa, and Co-Author of This Text

Chapter 15: Summary and

539
545
555
571
573
583
587

Appendices A-H are included on the open-access Student Study Site: www.sagepub.com/fitzgerald