

**FEDERATION METHODS AND STATISTICS COMPREHENSIVE EXAM**

Federated Graduate Sociology Program of:  
Texas Woman's University  
University of North Texas

Spring, 2006

**GENERAL INSTRUCTIONS FOR TAKING THE EXAM**

Before you begin the exam, it is advisable that you read through all the questions. Plan your time wisely. You have until 5:00 p.m. to complete the exam.

Please **WRITE ONLY ON EVERY OTHER LINE on ONE SIDE OF THE PAPER**. Please answer each question thoroughly. Answer in complete sentences. Write as neatly as possible—you will not get credit for what cannot be read!

**DO NOT PUT YOUR NAME ON THE PAPER**

**PUT ONLY YOUR ASSIGNED NUMBER \_\_\_\_\_**

**Part 1. FEDERATION METHODS COMPREHENSIVE EXAM****Spring, 2006**

(Remember: WRITE ONLY ON EVERY OTHER LINE on ONE SIDE OF THE PAPER).

- A. Define and provide an example of **four** of the following:
- a. Conceptual and operational definitions
  - b. Criterion validity and face validity
  - c. Split-half reliability and Cronbach reliability
  - d. Panel study and cohort study
  - e. Guttman scaling
  - f. Typology
- B. Select **three** of the following populations and, for each, discuss an appropriate sampling procedure. You must use at least three different sampling procedures.
- a. Four-year colleges/universities in the U.S.
  - b. Ecstasy (an illegal drug) users
  - c. Voters of Denton County
  - d. Households in the U.S.
- C. Discuss differences between quantitative research and qualitative research in conceptualization, operationalization, data collection, and data analysis. Use illicit drug use among college students in North Texas as a research problem to illustrate these differences.

**Part 2. FEDERATION STATISTICS COMPREHENSIVE EXAM****Spring, 2006**

(Remember: WRITE ONLY ON EVERY OTHER LINE on ONE SIDE OF THE PAPER).

A. For **six** of the following ten pairs, discuss when it is most appropriate to use which technique in the analysis of data.

1. Tests of statistical significance and measures of association
2. Chi-square test and F test
3. Pearson's  $r$  and Spearman's  $\rho$
4.  $t$  test and Z test
5. Lambda and Gamma
6. PRE and non-PRE measures of association
7. Standard deviation and range
8. Mean and median
9. Ordinary least squares regression and logistic regression
10. Interaction term and squared term in an ordinary least squares multiple regression analysis

B. Answer **one** of the following questions: question 1 **or** question 2.

1. Write a brief essay substantively interpreting the factor analysis presented in Table 1.
2. Write a brief essay substantively interpreting the logistic regression analysis presented in Table 2.

C. Answer **all** of the questions below.

1. List and briefly explain the assumptions that must be made to use ordinary least squares regression analysis.
2. What does each of the following tell us?
  - a. Unstandardized regression coefficient estimate (b)
  - b. Standardized regression coefficient estimate ( $\beta$ , or Beta)
  - c. Level of significance ( $\alpha$ , or alpha)
  - d. Coefficient of determination ( $R^2$ )
3. Write a brief essay substantively interpreting Table 3.

**Table 1. Rotated Factor Loadings from an Exploratory Factor Analysis of Indicators Measuring Nations' Science Activities**

Science activity variable	<u>Factor 1</u> Science research	<u>Factor 2</u> Science labor force	<u>Factor 3</u> Scientific organization	Communality
Number of science publications per capita	.94	.15	.19	.942
Number of science citations per capita	.95	.05	.20	.945
Number of national memberships in the International Council of Science Unions	.20	.34	.85	.878
Number of professional science organizations	.12	.16	.76	.618
Number of memberships in international science organizations	.18	.11	.88	.819
Number of scientists and engineers in research and development per capita	.47	.68	.17	.712
Number of tertiary engineering students per age group	-.15	.88	.18	.823
Number of tertiary science students per age group	.28	.48	.22	.357
Eigenvalues	1.96	1.85	1.73	
% of variance explained	29.23	27.56	26.33	

Note: Principal components extraction; varimax rotation.

**Table 2. Logistic Regression Estimates Predicting Teenage Pregnancy<sup>a</sup>, Female Adolescents, National Longitudinal Study of Adolescent Health, 1996**

Predictor	b	S.E.	Odds ratio
Age	.312***	(.059)	1.366
<i>Race/ethnicity</i>			
White	-	-	-
Black	.416	(.295)	1.516
Hispanic	.724***	(.315)	2.064
Asian	-.001	(.626)	.999
Other	.840	(.572)	2.317
Parent education (years)	-.191	(.107)	.826
Single-parent family (one parent=1, else=0)	.758***	(.256)	2.134
Poverty (poverty=1, else=0)	-.319	(.221)	.727
GPA (points)	-.180	(.141)	.836
Urban (urban=1, else=0)	-.590***	(.220)	.554
Exposure to intimate partner violence (5-point scale) <sup>b</sup>	1.228***	(.211)	3.416
Constant	-5.553***	(1.152)	.004
Model $\chi^2$		50.82	
Pseudo R <sup>2</sup>		.25	
N		5,263	

\*  $p \leq 0.05$  \*\*  $p \leq 0.01$  \*\*\*  $p \leq 0.001$

<sup>a</sup> Teenage pregnancy is coded 1 for being pregnant and coded 0 otherwise.

<sup>b</sup> A higher score indicates a higher degree of exposure.

**Table 3. Ordinary Least Squares Regression Estimates Predicting Incidents of Violent Behavior<sup>a</sup> by Gender, National Longitudinal Study of Adolescent Health, 1996**

Predictor	Females		Males	
	Unstandardized estimate (b)	Standardized estimate ( $\beta$ )	Unstandardized estimate (b)	Standardized estimate ( $\beta$ )
Parent education (years)	.061	.083	-.278*	-.261
Two-parent family (two parents=1, else=0)	-.121	-.100	.348	.130
Poverty (poverty=1, else=0)	.003	.001	-.492	-.222
GPA (points)	.005	.029	-.266**	-.256
Bad temper (bad temper=1, else=0)	.204	.192	.724***	.433
Urban (urban=1, else=0)	-.160	-.120	-.027	-.004
Exposure to street violence (5-point scale) <sup>b</sup>	.788***	.350	.685***	.311
Constant	-.699		.625	
R <sup>2</sup>	.083		.250	
N	5,306		4,953	

\*  $p \leq 0.05$  \*\*  $p \leq 0.01$  \*\*\*  $p \leq 0.001$  (two-tailed test)

<sup>a</sup> Incident of violent behavior is measured by a summated scale on number of violent incidents such as gang fighting, robbery, and use of weapons.

<sup>b</sup> A higher score indicates a higher degree of exposure.