The influences of age and gender of students' motorcycle rider on traffic violations and accident in a small city using a structural equation model

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Abstract

a

During the last three years, traffic accidents in Mataram-Lombok have been increasing significantly

Interestingly, most of the accidents were dominantly involving high school students' that using motorcycle.

b

A Structural Equation Modeling (SEM) was constructed using AMOS V.22.0. for the developed model with use of behavioral, violation and accident variables as a latent variables

c

The investigation was conducted using a questionnaire survey, in which the data were collected from 394 students covering eighteen high schools in Mataram

It was found that 87.5% of the students' motorcycle riders did not have riding licenses. Meanwhile, 51.53% of the respondents were above 17 years old and had been involved in traffic accidents

d

In addition, the study indicated significant relationships between student riding behavior and traffic violations, and between traffic violations and accidents.

Gender and age also show differences in the significance (*chi-square*) values between riding behavioral relationship to traffic violations and accidents

Introduction

Accident in Mataram

1

Most of the traffic accidents was caused by the driver's factor, so driver behavior while driving has an effect on accidents and traffic violations

- Accident events are often preceded by traffic violation behavior by drivers.
- Violations and traffic accidents that occur in Mataram City were dominantly involving high school students' that using motorcycle.
- Traffic violation can be defined as intervening variable (*mediation variable*) between driving behavior with traffic accident.

Accident Rate

2

The accidents rate has been increased significantly during the last three years, in 2015 as much as 231 crash to 318 in 2016 and 385 in 2017

Accident Factor

3

Many Accident factors to be found in a traffic crash.

Driving behavior becomes one of the causes of traffic accidents.

The influences of age and gender in the traffic accident

4

The age group of 16-30 years and 31-40 years is the highest contributor to the traffic accident in Mataram City at 67%.

RESEARCH SAMPLE

This research was conducted at 394 of student riders sample covering eighteen high schools in Mataram City

The Objectives of this Research

1. To investigate the influences of high school students' behavior riders toward traffic violation in Mataram City as a small city.
2. To evaluate the massive impact of traffic violations on traffic accidents in Mataram City based on age and gender.

VARIABLE OF THIS RESEARCH

Several variables was used in this research especially:

a. Exogenous variable (dependent variable), which is Driving Behavior
b. Intermediate variable (intervening variable), i.e. Traffic Violation
c. Endogenous variable (independent variable) that is Traffic Accident

SEM MODEL

SEM is a structural equation with multivariate analysis technique used to analyze the relationship between variables more complex compared with regression analysis or factor analysis.

Literature Review

DEFINITIONS

SEM MODEL

SAMPLE

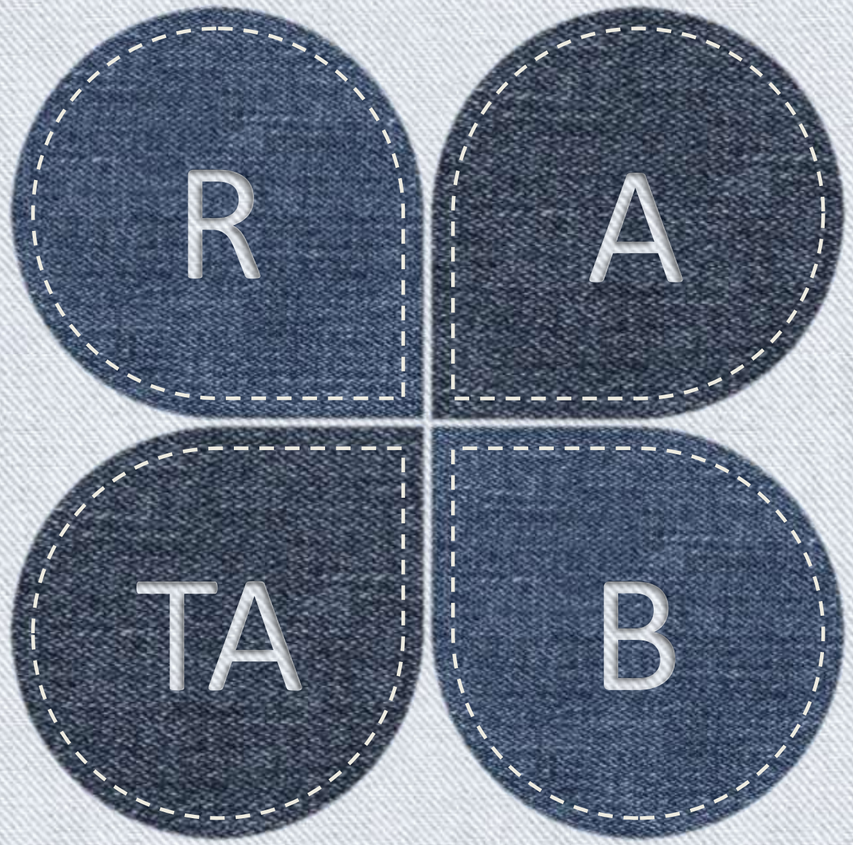
General Definitions

Driver or Rider

the motorcycle driver is also called a rider

Traffic Accident

an unexpected and accidental incident on the road involves a vehicle with or without other road users resulting in human casualties and/or loss of property.



Age

a unit of time that measures the time of existence of an object or creature, both living and dead.

Driving Behavior

the behavior of the owner or user of the vehicle in driving and caring for his vehicle.

VARIABLE LATEN AND MANIFES

EKSOGEN AND ENDOGEN VARIABLES

Measurement & Structural Model

ERROR at Measurenment

SEM ANALYSIS TOOLS

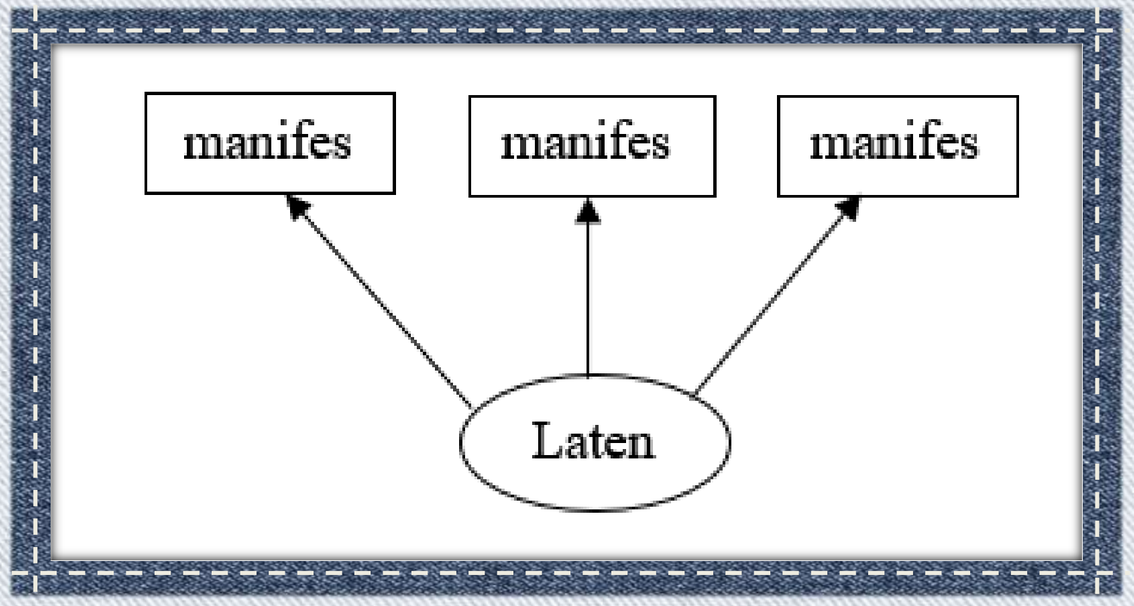
SEM

(Structural Equation Modeling)

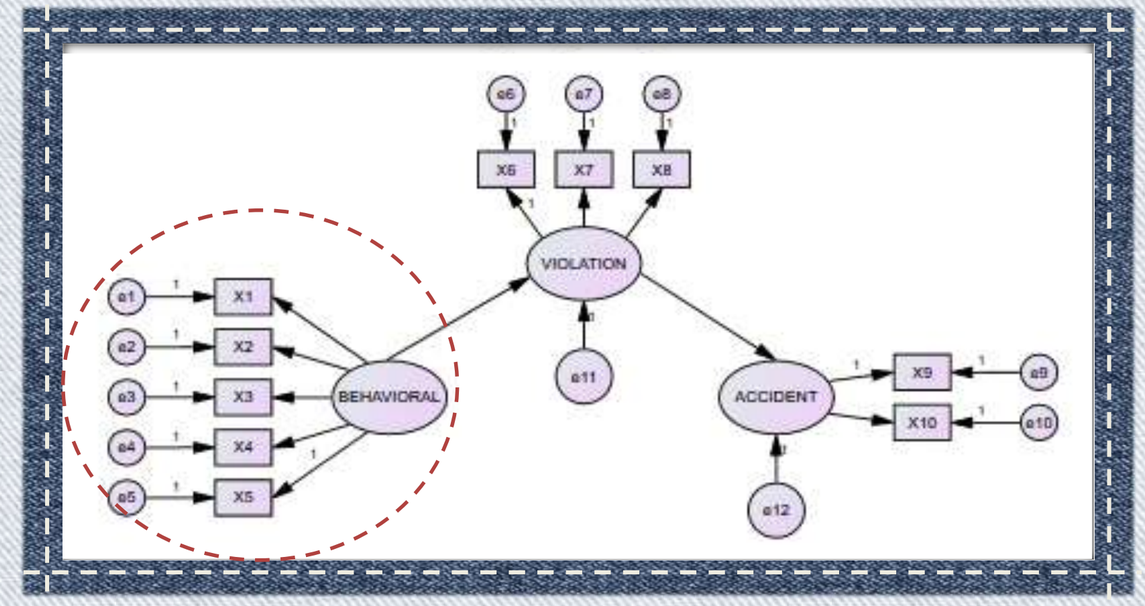
SEM is a structural equation with multivariate analysis technique used to analyze the relationship between variables more complex compared with regression analysis or factor analysis.

5 BASIC CONCEPT in SEM

Basic Concepts of SEM

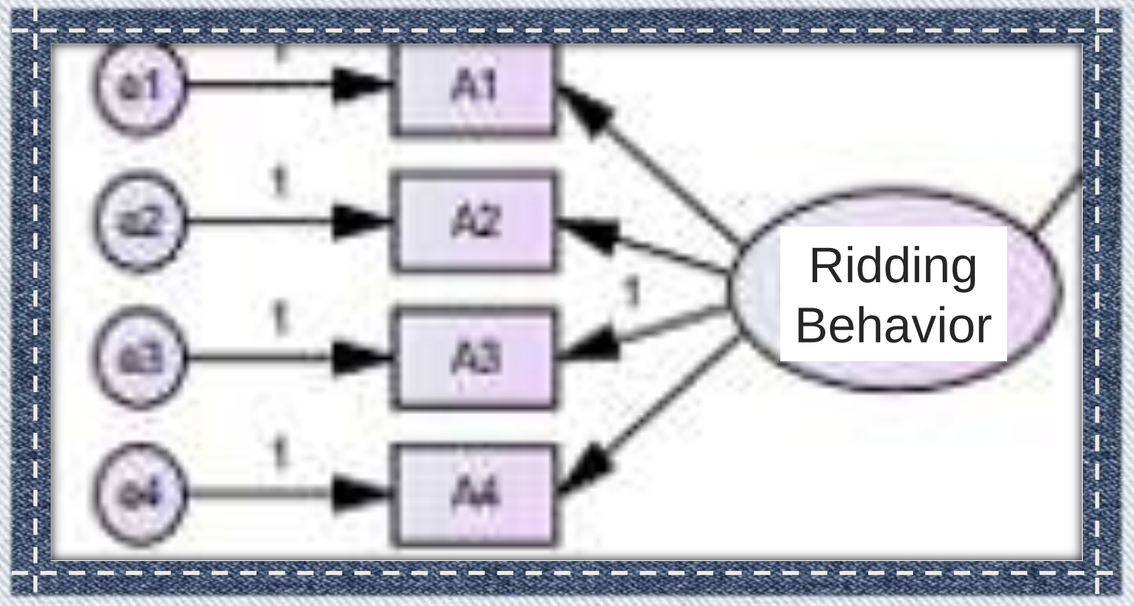


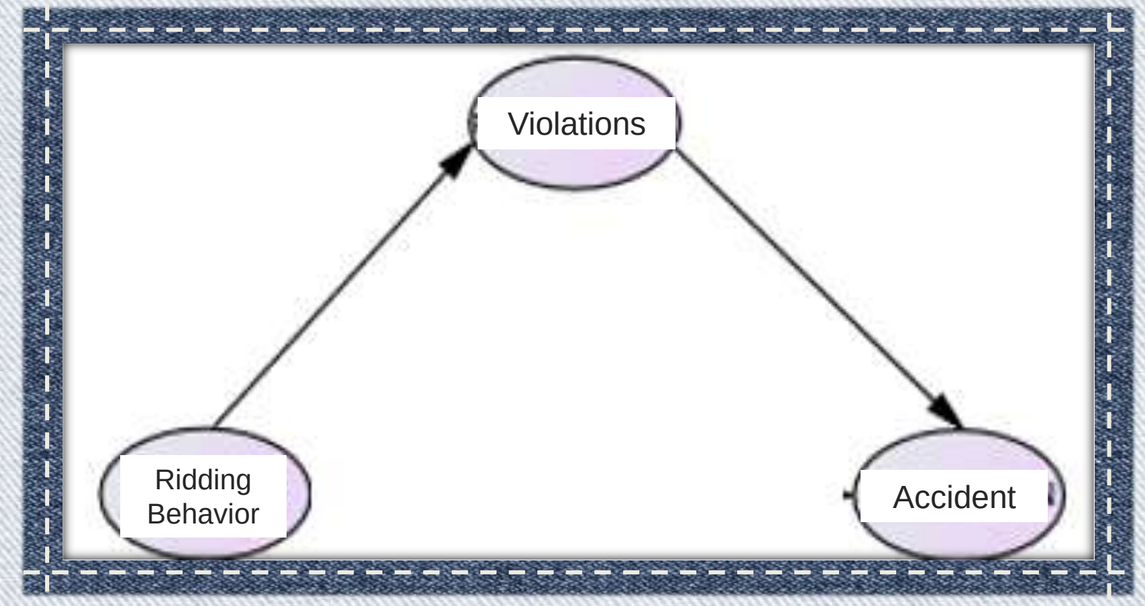
LATEN VARIABLES AND MANIFEST



EKSOGEN DAN ENDOGEN VARIABLES

Basic Concepts of SEM

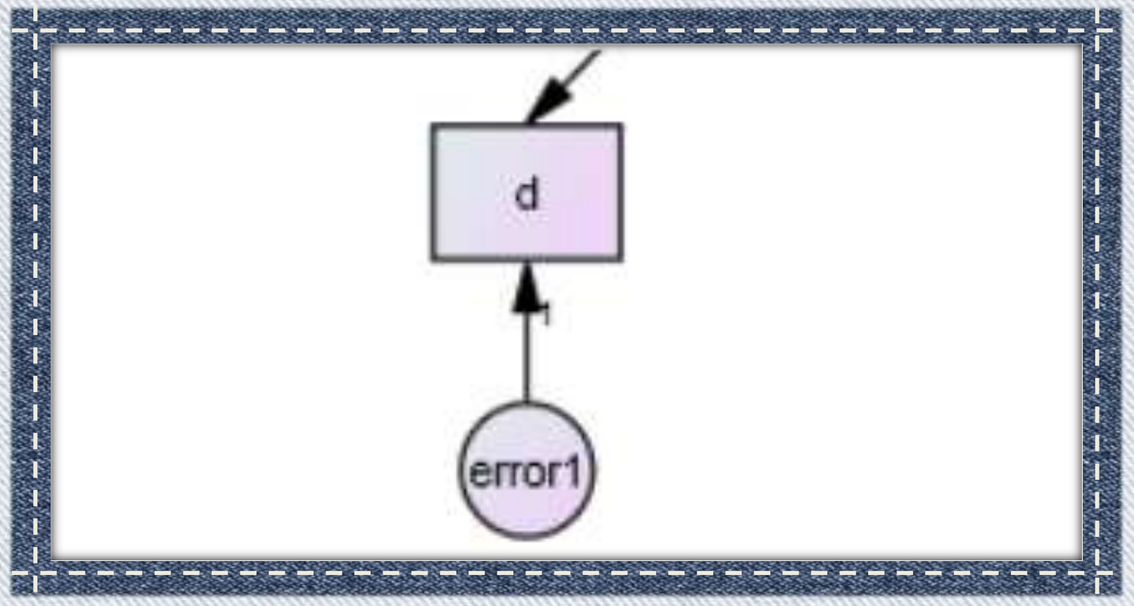


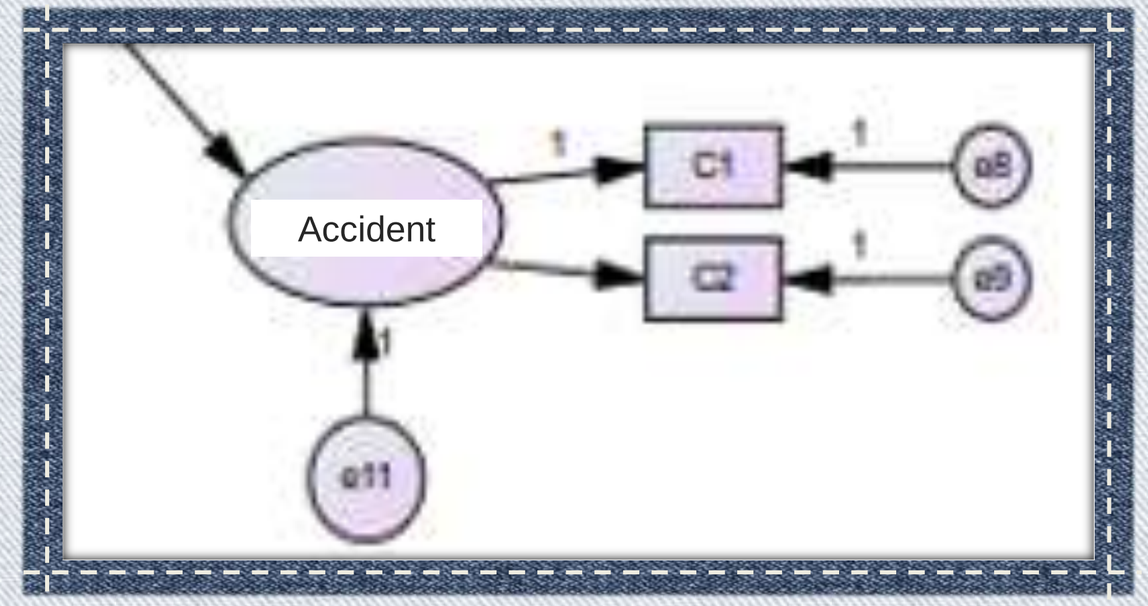


MEASUREMENT AND *MODEL STRUCTURAL*

Basic Concepts of SEM

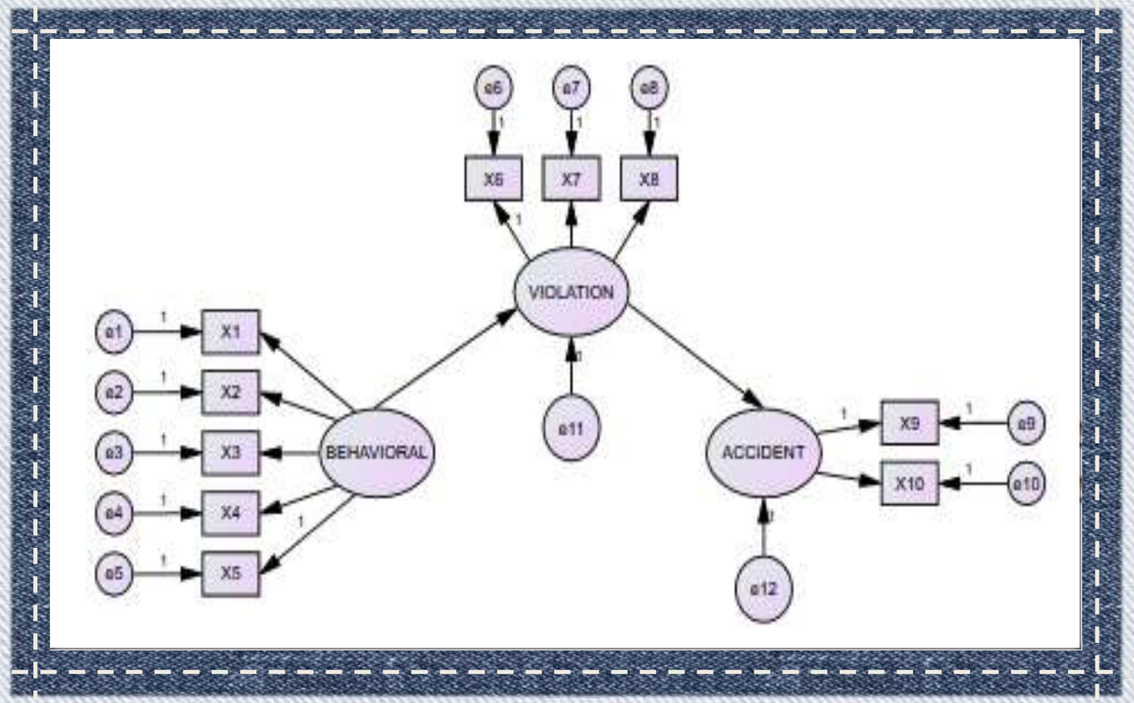
ERROR at Measurenment





Basic Concepts of SEM

SEM ANALYSIS TOOLS



CONFIRMATORY FACTOR ANALYSIS

This analysis tool is used to test a measurement model. With this tool, it will be known whether the existing indicators really can explain a construct.

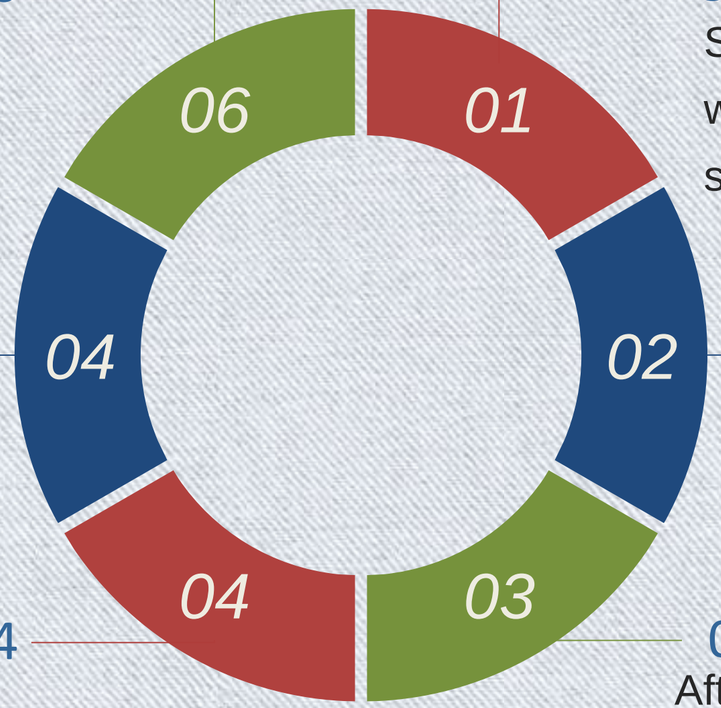
MULTIPLE REGRESSION ANALYSIS

This analytical tool is used to test a structural model. With this tool, it can be seen whether there is a significant relationship between exogenous variables (independent) with endogen (dependent) and how strong the relationship exists.

Results and Discussions

Validity Test for Questionnaire Instrument

Validity test is used to measure the validity or validity of a questionnaire instrument



06

The test of validity is the result of **r** calculated in Total column

OPEN SPSS PROGRAM

SPSS program is a program that can run on windows with data entered can be data that sourced from Microsoft Excel

05

In the Bivariate Correlation window, block all items and enter into the right column, check the Pearson box → Two-tailed → Flag significant correlations and then press OK.

02

Data questionnaire as many as 394 respondents who had previously been recapitulated in Microsoft Excel then copied and attached to the worksheet SPSS v.24.0

04

To test validity, press Analyze menu, then select Correlate and select Bivariate

03

After the data is completed, then give the name of the questionnaire items such as X1, X2, X3 and so on. X1, X2, X3 and so on represent every statement of 37 pieces.

VALIDITY TEST RESULT

	Calculate of r	Statical of r	Result		Calculate of r	Statical of r	Result
P13	0,216	0,124	Valid	P37	0,419	0,124	Valid
P10	0,531	0,124	Valid	P4	0,388	0,124	Valid
P21	0,245	0,124	Valid	P7	0,543	0,124	Valid
P30	0,534	0,124	Valid	P18	0,572	0,124	Valid
P35	0,562	0,124	Valid	P28	0,452	0,124	Valid
P9	0,206	0,124	Valid	P6	0,570	0,124	Valid
P23	0,242	0,124	Valid	P22	0,553	0,124	Valid
P24	0,587	0,124	Valid	P19	0,528	0,124	Valid
P31	0,151	0,124	Valid	P20	0,490	0,124	Valid
P32	0,191	0,124	Valid	P25	0,335	0,124	Valid
P8	0,472	0,124	Valid	P26	0,394	0,124	Valid
P29	0,633	0,124	Valid	P27	0,416	0,124	Valid
P33	0,596	0,124	Valid	P2	0,347	0,124	Valid
P1	0,510	0,124	Valid	P3	0,342	0,124	Valid
P34	0,506	0,124	Valid	P15	0,298	0,124	Valid
P17	0,434	0,124	Valid	P16	0,381	0,124	Valid
P5	0,420	0,124	Valid	P11	0,421	0,124	Valid
P14	0,472	0,124	Valid	P12	0,422	0,124	Valid
P36	0,507	0,124	Valid				

For Example :

The table on the side shows that all the instruments of the statement in the questionnaire used are valid.

RELIABILITY TEST

Valid instruments will then be tested for reliability. The main concept of reliability is the extent to which a measurement result can be trusted, while the questionnaire is said to be reliable if the respondent's answer to a statement is consistent or stable over time.

01

To test the reliability, press Analyze menu, then select Scale and select Reliability Analysis

02

In the Reliability Analysis window, block all variables except TOTAL and insert into the items column by pressing the right-hand arrow.

03

Press OK, then the display will appear reliability test results.

Output Of Reliability Test

Reliability

```
[DataSet1] E:\MATERI KULIAH\SEMESTER
```

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	177	100,0
	Excluded[a]	0	,0
	Total	177	100,0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
,869	37

Viewed from the table on the side obtained the value of Cronbach's Alpha coefficient of 0.869. Instruments can be said to be very reliable because of construct realibility > 0.80. Measurers in this case a questionnaire that has been tested previously can be said to be consistent over time if the measurement is repeated

PHASE OF STRUCTURAL EQUATION MODELING ANALYSIS (SEM)

01

Test Of *Data Normality*

Normality test data is needed to know a data has been normal distribution or not.

02

OUTLIER Detection

to see the distribution of outlier data in the Mahalanobis distance table.

03

Test Of *MODEL FIT*

Fit Model test

04

MODEL *Modification*

SEM models that do not "fit" will be provided recommendations for modification of the model.

05

Relationship Analysis

Relationships between variables and between variables with indicators.

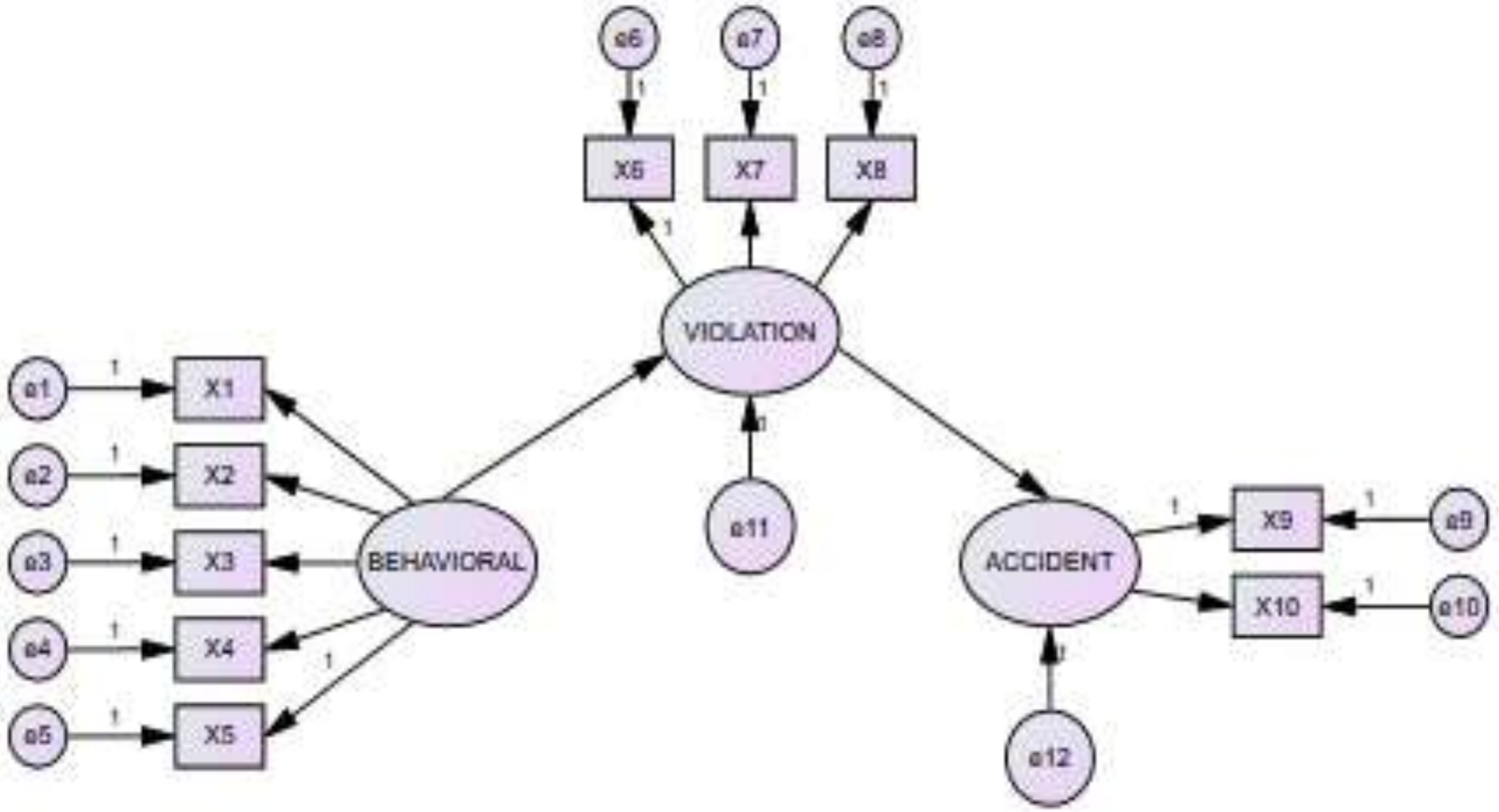
06

MULTIPLE GROUP ANALYSIS

Find out if there are differences in behavior between age and gender categories.

Basic Model:

The Influence Model of Student Driving Behavior on Traffic Accidents



This table shows that the degree of freedom, chi-square and probability values. The model is said to fit if it has probability value> 0,05. Thus the three models can not be said fit.

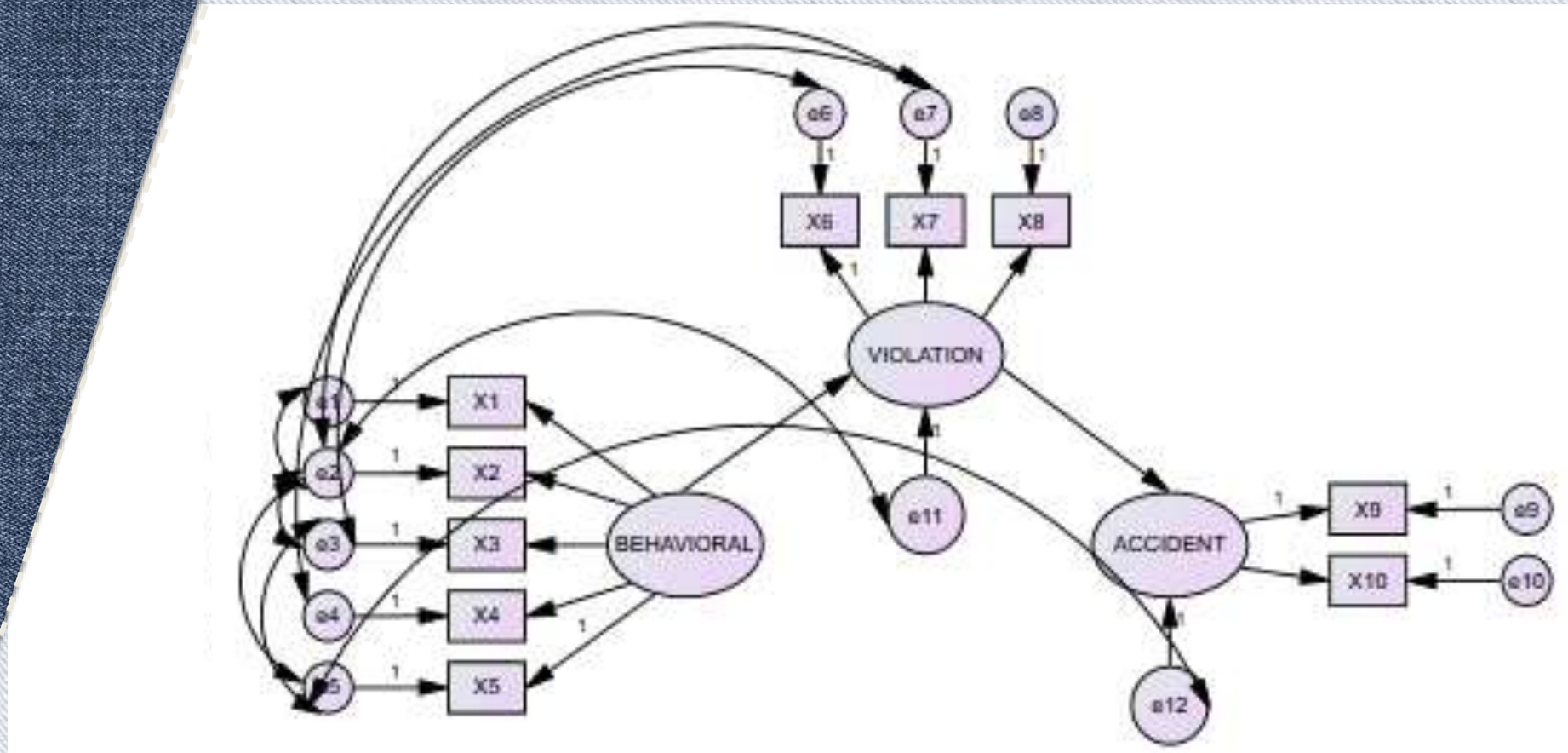
Table of Result of Model Fit test

Goodness-of-Fit Indices	***Cut off Values***	**Result**	**Model Evaluation**
Degree of freedom (Df)	***Positif (+)***	**33**	*indentified*
X^2 (Chi square)	***≤ 47.400***	**211.872**	Not *fit*
Signifance of Probability	***≥ 0.05***	**0.000**	Not *fit*
CMIN/DF	≤ 2,00	6.420	Not *fit*
GFI	≥ 0,90	0.898	Not *fit*
RMSEA	≤ 0,05	0.121	Not *fit*
AGFI	≥ 0,90	0.831	Not *fit*
TLI	≥ 0,90	0.715	Not *fit*
NFI	≥ 0,90	0.765	Not *fit*

Based on the fit model fit test table above, that fit model test for all three age models produce SEM model that is not fit, so it is necessary to modify the model and test it again.

Modified Model:

The Influence Model of Student Driving Behavior on Traffic Accidents



Goodness of indices Result

It appears that for the significance of 1% and 5% the multivariate number indicates that the data has been normal distribution and there is no outlier data.

Goodness of Fit Indices	Cut off Value	Result	Model Evaluation
Degree of Freedom (DF)	Positive (+)	24	identified
X2 (Chi square)	≤ 38.885 [=CHINV (0.05 ; 24)]	27.668	fit
Probability of significance	≥ 0.05	0.274	fit
CMIN DF	≤ 2.00	1.153	fit
GFI	≥ 0.90	0.985	fit
RMSEA	≤ 0.05	0.020	fit
AGFI	≥ 0.90	0.966	fit
TLI	≥ 0.90	0.992	fit
NFI	≥ 0.90	0.969	fit

Model Relationship Analysis

From the output display, since all P values are ***, it can be concluded that all indicators can explain all constructs. Likewise with the relationship between constructs there is a significant relationship. In addition to the probability value (P), a relationship is considered significant if it has CR (Critical Ratio) value ≥ 1.96. In the table above shown all CR values have ≥ 1.96, thus the relationship between the indicator with the construct and the relationship between constructs is already significant.

	Estimate	SE	CR	P	Lable
Violations ← driving behavior	2.157	309	6.976	***	
Accident ← violations	0.578	089	6.507	***	
X5 ← driving behavior	1.478	219	6.750	***	
X4 ← driving behavior	1.226	166	7.400	***	
X3 ← driving behavior	1.386	205	6.757	***	
X2 ← driving behavior	0.781	214	3.656	***	
X1 ← driving behavior	1.000				
X6 ← violations	1.000				
X7 ← violations	0.780	078	9.990	***	
X8 ← violations	0.774	115	6.744	***	
X9 ← accident	1.000				
X10 ← accident	0.973	140	6.951	***	

Model Relationship Analysis

If the loading factor number shown in the estimates > 0.5 column, it indicates a close relationship between the constructs.

Relationship	estimate
Violations ←-------- riding	0.439
Accident ←------ violations	0.375
X5 ←----- Behavior	0.454
X4 ←----- Behavior	0.675
X3 ←----- Behavior	0.454
X2 ←----- Behavior	0.246
X1 ←----- Behavior	0.574
X6 ←----- Violations	0.655
X7 ←----- Violations	0.787
X8 ←----- Violations	0.416
X9 ←----- Accident	0.740
X10 ←----- Accident	0.674

	Estimate
VIOLATIONS	0.814
ACCIDENT	0.285

BEETWEN of VARIABLE

In the table beside, if the loading factor number shown in the column estimates > 0.5, it shows a close relationship between constructs

BETWEN VARIABLE WITH INDICATORs

Violations estimate value in table above [0.814], can be interpreted that the BEHAVIOR variable affects 81.4% of the VIOLATIONS variable, while the rest (100% - 81.4% = 18.6%) is influenced by other factors, indicated by error (e11) where the variable is outside this study. Similarly, the number 0.285 can be interpreted as a VIOLATIONS variable affecting 28.5% of the ACCIDENT variables while the rest is indicated by error (e12).

Model Relationship Analysis

In the table beside shows only indicator X9 and X7 that have influence above 50% ie 54.8% and 62%. On the other hand, based on the analysis of sex and age also shows differences in the value of significance (chi-square) between "behavioral" relationship with "violation" of traffic and accidents. The other side, Gender and age variables also show differences in the significance (**chi-square**) values between riding behavioral relationship to traffic violations and accidents. By 195 male data and 179 female data, the analysis was shown the significance of the effect of driving behavior to violations and accidents by 6% lower than the driving behavior of women, and the students under the 17 year olds are more sensitive to traffic violations than others

Relationship	estimate
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X5 ←----- Behavior	0.454
X4 ←----- Behavior	0.675
X3 ←----- Behavior	0.454
X2 ←----- Behavior	0.246
X1 ←----- Behavior	0.574
X6 ←----- Violations	0.655
X7 ←----- Violations	0.787
X8 ←----- Violations	0.416
X9 ←----- Accident	0.740
X10 ←----- Accident	0.674

Conclusions

Conclusions:

The Influence Model of Student Driving Behavior on Traffic Accidents

Based on the data analysis and discussions that have been done, few main conclusions are as follows:

1. More than 87.5% of the students' motorcycle riders in Mataram City do not have riding licenses.
2. There are 51.53% of the respondents were above 17 years old and had been involved in traffic accidents, and 6% difference of influences riding behavior to violations and accidents
3. This study indicates significant relationships between student riding behavior and traffic violations and between traffic violations and accidents to.
4. There is a significant difference (*chi-square*) between behavior and violations by age and gender.