

# **Logistic Regression Models to Integrate Actuarial and Psychological Risk Factors**

**For predicting 5- and 10-Year  
Sexual and Violent Recidivism Rates**

**WI-ATSA June 2-3, 2016**

# **Overview**

- **Brief description of logistic regression**
- **Background of VRS-SO calculator development**
- **Brief tour of current calculator features**
- **Interactive demonstration and questions**

## Logistic Regression

Logistic regression is used when:

- Outcomes to be predicted are discrete (e.g. True/False)
- Binary logistic models estimate probabilities of binary outcomes based on one or more predictor variables. The relationship between predictor variables (e.g., Static-99R, VRS-SO scores, etc.) and predicted outcomes (e.g., recidivism) may be nonlinear.

Logistic regression equations model linear relationships between predictor variables and the “**logit**” (or “***log odds***”) of outcome probabilities.

# Logistic Regression

## “Why not just model outcome probabilities?”

Probabilities are bounded between 0 and 1.

Perceived risk of event likelihoods are not linear with probabilities.

As  $p$ . goes from .1  $\rightarrow$  .2 event likelihood doubles.

As  $p$ . goes from .8  $\rightarrow$  .9 likelihood increases slightly.

## “So what are the odds of an event?”

$$\text{Event odds} = \frac{P(\text{event})}{1 - P(\text{event})}$$

Odds range from 0 to  $\infty$  centered at 1 (where  $p = .5$ ).

**Odds ratios express change in event likelihoods as the probabilities of an event change** (as a function of predictor variables).

# Logistic Regression

**The natural log of an odds is called the "log odds" or "logit".**

Natural logarithms:  $e^{\ln(x)} = \ln(e^x) = x$ ;

Logits range from  $-\infty$  to  $+\infty$ , centered at 0

When  $p = .5$ , Odds = 1, and  $\ln(1) = 0$

**Logits are nearly linear across a wide range of probabilities.**

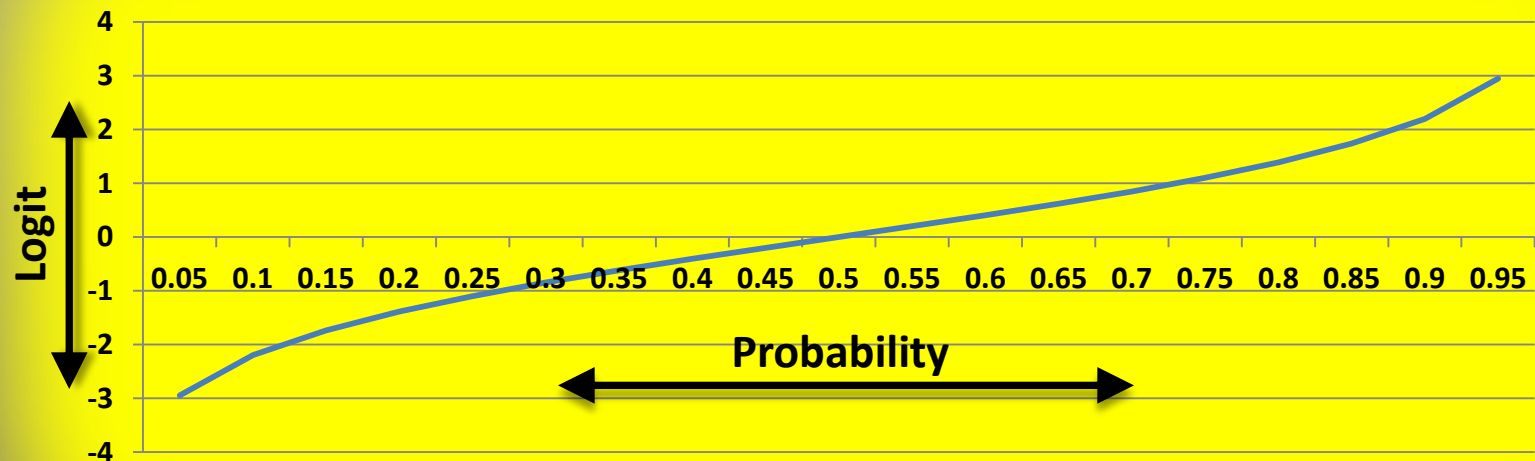
**Useful way “scale” probabilities with respect to event likelihoods.**

**Logistic regression models the change in logits as a function of predictor variables.**

Coefficients of a logistic regression model are log-odds ratios. They indicate how the log-odds of an event change with each unit change of a predictor variable.

**Logits are continuous and nearly linear with probabilities**  
**Centered about  $p = .5$ , OR = 1, log odds = 0**

P	Odds	Logit
.05	.053	-2.944
.10	.111	-2.197
.25	.333	-1.099
.50	1	0
.75	3	1.099
.90	9	2.197
.95	19	2.944



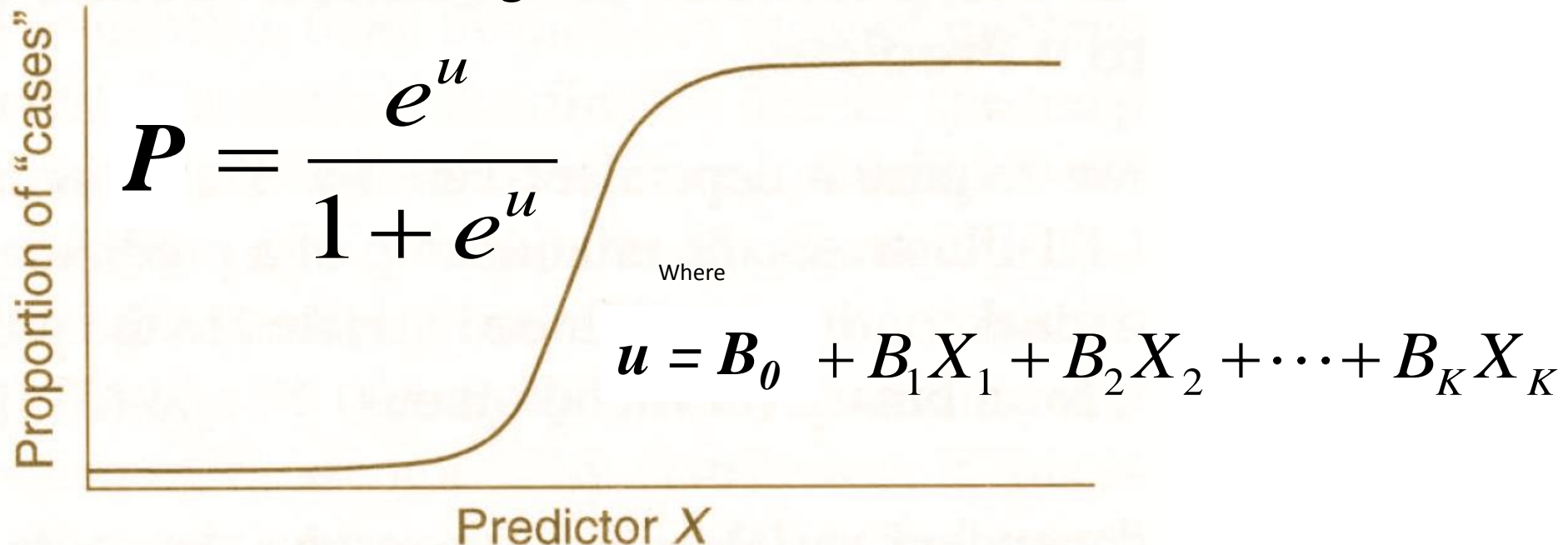
**Linear regression cannot be used to model probabilities of discrete outcomes because errors between predicted and observed values cannot be homoskedastic.**

(Assumption that error variance around the regression line is generally the same for all values of the predictor variable  $X$  – aka – “Homogeneity of error variance”)

**...But logits are nearly linear across probabilities. We CAN model them!**

**The Link:**

**Logistic Function**

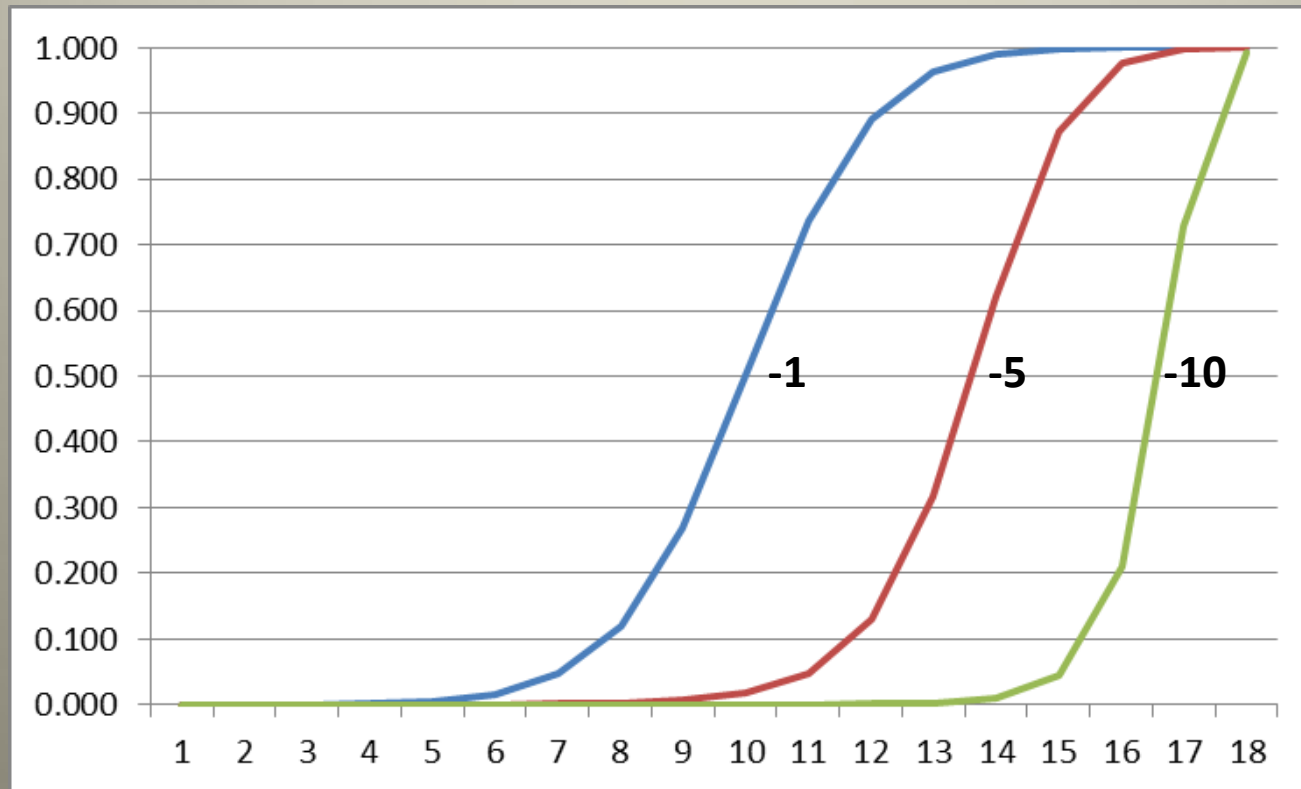


# Logistic Regression

How do  $B_0$  and  $B_1$  affect the shape of the logistic function?

$B_0$  moves the function to the left or right. Reflects “centering” of predictor variables. Represents the log odds of the recidivism base rate at the centered value.

$Y = e^{B_0 + B_1 \cdot \text{score}} / (1 + e^{B_0 + B_1 \cdot \text{score}})$  where  $B_0 = -10, -5, \text{ and } -1;$   $B_1 = 5$





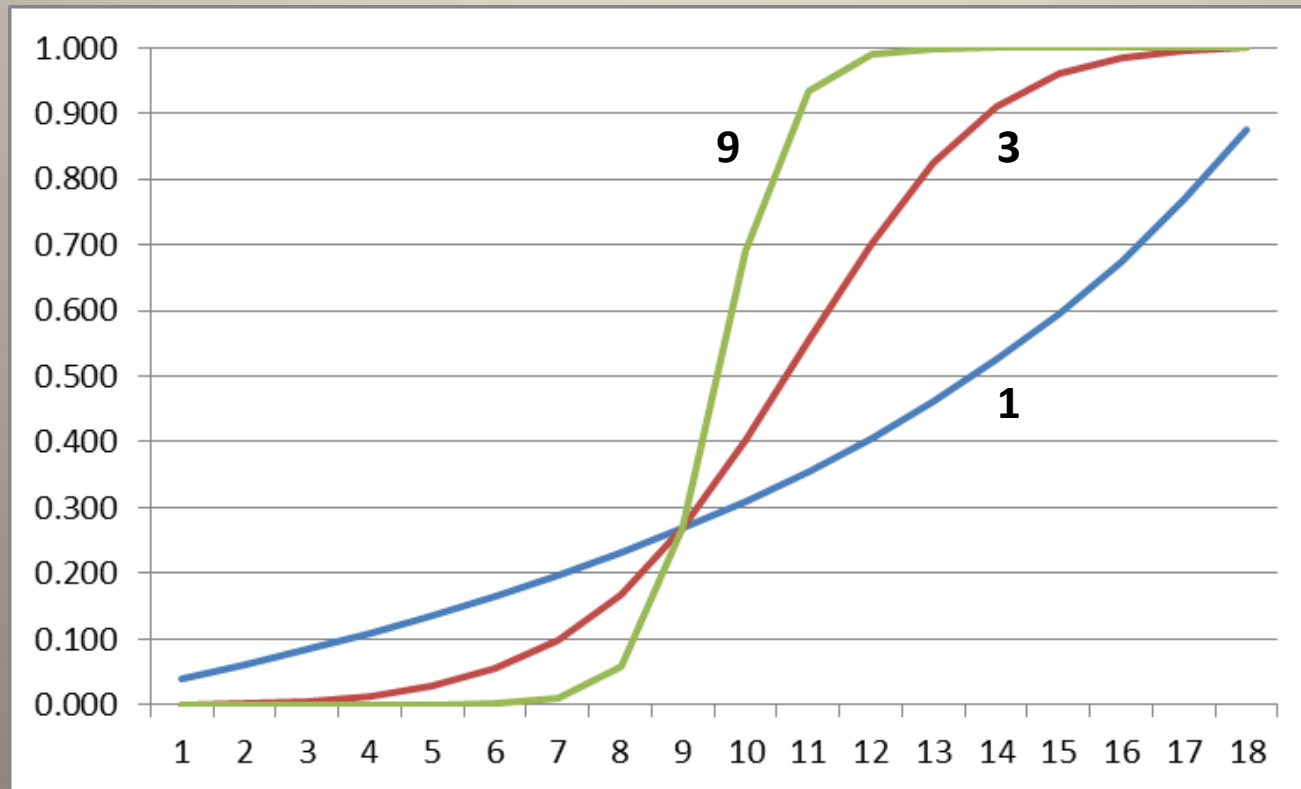
# Logistic Regression

How do  $B_0$  and  $B_1$  affect the shape of the logistic function?

$B_1$  determines the slope of the function.

Represents increase in relative risk (log-odds ratios) as predictor scores increase.

$$Y = e^{B_0 + B_1 \cdot \text{score}} / (1 + e^{B_0 + B_1 \cdot \text{score}}) \text{ where } B_0 = -1; \quad B_1 = 1, 3, \text{ and } 9$$



# Logistic Regression

**“How well does the logistic model actually fit observed outcomes?”**

The Hosmer-Lemeshow test is a goodness-of-fit measure between observed event rates (recidivism data) and the rate of events predicted by a logistic regression model.

A good model fit is indicated by a non-significant  $\chi^2$  statistic, indicating there are not systematic differences between predicted and observed values.

Hosmer, D. W. & Lemeshow, S. (2010). *Applied logistic regression* (2<sup>nd</sup> Ed.). New York: Wiley.

## **Background of VRS-SO calculator development**

## Evaluation and Applications of the Clinically Significant Change Method with the Violence Risk Scale-Sexual Offender Version: Implications for Risk-Change Communication

Mark E. Olver\*, Sarah M. Beggs Christofferson<sup>†</sup> and Stephen C. P. Wong<sup>‡,§,¶</sup>

Applied logistic regression modeling to estimate 5-year rates of sexual and violent recidivism based on Static-99R , VRS-SO pretreatment dynamic, and VRS-SO pre to post treatment change scores.

From three samples with N = 320, 218, and 407. Overall sexual recidivism was 10.9%.

Intercept	$B_0 = -4.479$
Static-99R	$B_1 = 0.254$
VRS-SO Pretreatment	$B_1 = 0.065$
VRS-SO Change	$B_1 = -0.119$

$$\text{Where predicted recidivism rate} = \frac{e^{B_0 + B_1 \times \text{Score}}}{1 + e^{B_0 + B_1 \times \text{Score}}}$$

***“The use of logistic regression modeling to generate recidivism estimates incorporating risk and change information thus helps to reduce arbitrariness and subjectivity in arriving at post-treatment risk appraisals and can aid communication.”***

## The Calculator Tab

<table> <tr> <th>Static Score</th><th>VRS-Pre</th><th colspan="2">VRS-Change</th></tr> <tr> <td>7</td><td>32</td><td colspan="2">0</td></tr> </table>				Static Score	VRS-Pre	VRS-Change		7	32	0	
Static Score	VRS-Pre	VRS-Change									
7	32	0									
B0	B1	B1	B1								
-4.479	0.254	0.065	-0.119								
Predicted Recidivism =											
35.0											

So we built an Excel calculator:

Input the Static-99R, VRS-SO pre-treatment, and VRS-SO change scores .... and the predicted recidivism rate was automatically calculated.

$$\text{Prob} = 100 * (e^{\text{logit}} / (1 + e^{\text{logit}}))$$

*“In our view, this is arguably more individualized and more meaningful than the broad categories of already okay, recovered, improved, unchanged, and deteriorated, although the methods are by no means mutually exclusive and conceivably can be used in tandem.”*

We shared it with Mark Olver to get his opinion and thoughts ...

His reply: “Great! But, ...

Can we adapt this to include other coefficient values for 2 rather than 3 predictors?

Can we post the calculator to [www.psynergy](http://www.psynergy) free for VRS-SO users?

I’m revising the norms to include a fourth sample. I have the regression coefficients for 5- and 10-year follow-ups (sexual and violent) for the Static-99R and VRS-SO pretreatment dynamic and change scores finalized.

I’m also computing all the recidivism estimates for these four outcomes for the VRS-SO alone and the VRS-SO dynamic + static scores.

Ultimately this was to generate manual tables, but having a calculator online would greatly minimize error for users and would be a user friendly alternative to sifting through pages of tables in the revised technical manual.

Can we modify the calculator to do that?”

# LR Models Predicting Sexual Recidivism

## (N = 913 with both 5 and 10 year follow-up)

Regression model	5-year Sexual Recidivism								10-year Sexual Recidivism						
	B	SE	Wald	p	e <sup>B</sup>	95% CI			B	SE	Wald	p	e <sup>B</sup>	95% CI	
Model 1															
VRS-SO static	.210	.027	54.08	<.001	1.22	1.15	1.29		.211	.024	80.16	<.001	1.23	1.18	1.29
Constant (B <sub>0</sub> )	-4.076	.334							-3.653	.279					
Model 2															
VRS-SO dynamic (pre)	.088	.014	40.68	<.001	1.09	1.06	1.12		.087	.012	54.20	<.001	1.09	1.07	1.12
Constant (B <sub>0</sub> )	-4.362	.409							-3.833	.344					
Model 3															
VRS-SO pretreatment total	.080	.011	56.42	<.001	1.08	1.06	1.11		.082	.009	78.41	<.001	1.09	1.07	1.11
Constant (B <sub>0</sub> )	-4.993	.444							-4.520	.374					
Model 4															
Static-99R	.261	.049	27.88	<.001	1.30	1.18	1.43		.266	.042	39.94	<.001	1.31	1.20	1.42
VRS-SO dynamic (pre)	.054	.015	12.45	<.001	1.06	1.02	1.09		.053	.013	15.92	<.001	1.05	1.03	1.08
Constant (B <sub>0</sub> )	-4.625	.440							-4.065	.368					
Model 5															
VRS-SO pretreatment total	.082	.011	58.15	<.001	1.09	1.06	1.11		.085	.009	81.99	<.001	1.09	1.07	1.11
VRS-SO change	-.148	.042	12.41	.001	.86	.79	.94		-.148	.036	16.54	<.001	.86	.80	.93
Constant (B <sub>0</sub> )	-4.552	.459							-4.124	.385					
Model 6															
Static-99R	.247	.050	24.70	<.001	1.28	1.16	1.41		.254	.042	35.74	<.001	1.29	1.19	1.40
VRS-SO dynamic (pre)	.060	.015	15.15	<.001	1.06	1.03	1.09		.059	.013	19.95	<.001	1.06	1.03	1.09
VRS-SO change	-.133	.043	9.59	.002	.88	.80	.95		-.130	.037	12.23	<.001	.88	.82	.95
Constant (B <sub>0</sub> )	-4.247	.451							-3.736	.377					

# LR Models Predicting Violent Recidivism (N = 913 with both 5 and 10 year follow-up)

Regression model	5-year Violent Recidivism								10-year Violent Recidivism						
	B	SE	Wald	p	e <sup>B</sup>	95% CI			B	SE	Wald	p	e <sup>B</sup>	95% CI	
Model 1															
VRS-SO static	.169	.020	74.12	<.001	1.19	1.14	1.23		.178	.018	96.92	<.001	1.20	1.15	1.24
Constant (B <sub>0</sub> )	-2.742	.221							-2.256	.192					
Model 2															
VRS-SO dynamic (pre)	.080	.011	57.26	<.001	1.08	1.06	1.11		.080	.010	67.29	<.001	1.08	1.06	1.11
Constant (B <sub>0</sub> )	-3.183	.297							-2.634	.265					
Model 3															
VRS-SO pretreatment total	.071	.008	78.95	<.001	1.07	1.06	1.09		.073	.007	97.03	<.001	1.08	1.06	1.09
Constant (B <sub>0</sub> )	-3.643	.311							-3.128	.275					
Model 4															
Static-99R	.266	.037	50.64	<.001	1.30	1.21	1.40		.293	.034	72.29	<.001	1.34	1.25	1.43
VRS-SO dynamic (pre)	.044	.012	14.09	<.001	1.05	1.02	1.07		.040	.011	13.66	<.001	1.04	1.02	1.06
Constant (B <sub>0</sub> )	-3.351	.314							-2.766	.278					
Model 5															
VRS-SO pretreatment total	.075	.008	83.68	<.001	1.08	1.06	1.10		.078	.008	105.09	<.001	1.08	1.07	1.10
VRS-SO change	-.124	.032	14.68	<.001	.88	.83	.94		-.147	.031	23.11	<.001	.86	.81	.92
Constant (B <sub>0</sub> )	-3.322	.321							-2.788	.283					
Model 6															
Static-99R	.255	.038	46.04	<.001	1.29	1.20	1.39		.282	.035	65.69	<.001	1.33	1.24	1.42
VRS-SO dynamic (pre)	.051	.012	17.99	<.001	1.05	1.03	1.08		.049	.011	19.27	<.001	1.05	1.03	1.07
VRS-SO change	-.105	.033	9.91	.002	.90	.84	.96		-.123	.031	15.38	<.001	.88	.83	.94
Constant (B <sub>0</sub> )	-3.104	.322							-2.509	.286					




# VRS-SO Calculator

- **39 Excel worksheets navigated using hyperlinks**
- **Includes calculators for twenty-four separate LR models**
  - Six LR models to predict
    - 5 and 10-year risk
    - Sexual and violent recidivism
  - Provides 1- and 2-tailed Confidence Intervals (90% and 95% CIs)
  - Single-click button to format output
  - Single-click button to print output or save to a PDF file
- **Graphical output of each LR recidivism prediction models**
  - User specified models, predicted recidivism shown across full range of scores
  - Single-click button to print output or save to a PDF file
- **Primer on logistic regression computational methods**
- **Frequently Asked Questions**

# [http://www.psynergy.ca/VRS\\_VRS-SO.html](http://www.psynergy.ca/VRS_VRS-SO.html)

**Psynergy Consulting**  
Forensic Risk Assessment and Treatment of Violence and Antisocial Behaviours

  
**Psynergy Consulting**  
*Innovative Ideas for the Assessment,  
Treatment & Management of Violence*

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## VRS & VRS-SO

### The Violence Risk Scale - VRS

[Brief Introduction](#)

[List of References](#)

[Qualification of Users and User Guidelines](#)

[Training in the use of VRS](#)

[VRS Report Template](#)

Frequently asked questions - FAQ (under development)

Order information - please see Purchase Information page

### The Violence Risk Scale: Screening Version - VRS-SV

[Brief Introduction](#)

### The Violence Risk Scale: Sexual Offender Version - VRS-SO

[Brief Introduction](#)

[List of References](#)

[Qualification of user and user guidelines](#)

[Training in the use of VRS-SO](#)

[VRS-SO Calculator](#)

Frequently asked questions - FAQ (under development)

Order information - please see Purchase Information page

### The Violence Risk Scale: Youth Version - VRS-YV

[Brief Introduction](#)

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## **Tour of VRS-SO calculator features**

# VRS-SO Calculator Landing Page

VRS-SO Calculator 12-14-2015 - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View Developer Acrobat

Clipboard Font Alignment Number Styles Cells Editing

AutoSum Fill Clear Sort & Filter Find & Select

A1	HOME			
A	B	C	D	E
1	<a href="#">Logistic Regression: A primer on computational methods</a>			
2				
3	<b>Predicted 5- and 10-Year Sexual Recidivism Rates Based on Logistic Regression of VRS-SO and Static-99R Risk and Change Scores</b>			
4	<a href="#">5 Year Sexual Recidivism Using VRS-SO Static Only</a>			
5	<a href="#">5 Year Sexual Recidivism Using VRS-SO Pretreatment dynamic Only</a>			
6	<a href="#">5 Year Sexual Recidivism Risk Using VRS-SO Pretreatment Total Only</a>			
7	<a href="#">5 Year Sexual Recidivism Risk Using Static-99R and VRS-SO Pretreatment dynamic</a>			
8	<a href="#">5 Year Sexual Recidivism Risk Using VRS-SO Pretreatment Total and VRS-SO Change</a>			
9	<a href="#">5 Year Sexual Recidivism Risk Using Static-99R, VRS-SO (Pre), and VRS-SO Change</a>			
10				
11	<b>Predicted 5- and 10-Year Violent Recidivism Rates Based on Logistic Regression of VRS-SO and Static-99R Risk and Change Scores</b>			
12	<a href="#">5 Year Violent Recidivism Using VRS-SO Static Only</a>			
13	<a href="#">5 Year Violent Recidivism Using VRS-SO Pretreatment dynamic Only</a>			
14	<a href="#">5 Year Violent Recidivism Risk Using VRS-SO Pretreatment Total Only</a>			
15	<a href="#">5 Year Violent Recidivism Risk Using Static-99R and VRS-SO Pretreatment dynamic</a>			
16	<a href="#">5 Year Violent Recidivism Risk Using VRS-SO Pretreatment Total and VRS-SO Change</a>			
17	<a href="#">5 Year Violent Recidivism Risk Using Static-99R, VRS-SO (Pre), and VRS-SO Change</a>			
18				
19	<b>Frequently Asked Questions</b>			
20	<a href="#">Who should I contact if I have questions about scoring the VRS-SO?</a>			
21	<a href="#">Who should I contact if I have technical questions about using this workbook?</a>			
22	<a href="#">Can I get a more complete description of the normative samples?</a>			
23	<a href="#">The samples differ in their base rates. Does this matter?</a>			
24				
25				
26				
27				

Ready 100%

# VRS-SO Calculator Landing Page

- **Save the workbook to your default working folder.**
  - **Copies can be made using the “File” tab and “Save As” option**
- **HOME: The place to begin and return.**
- **Six LR models: 2 types of recidivism; 2 follow-up periods**
  - **Each uses different predictor variables**
  - **All function the same way**
- **Each underlined object hyperlinks to a calculator for that LR model**
  - **Example: 10-year sexual recidivism model: Static-99R, Pretreatment dynamic, and pre to post treatment change.**

# VRS-SO Calculator LR Models

VRS-SO Calculator WI-ATSA - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View Developer Acrobat

Clipboard Font Alignment Number Styles Cells Editing

B3 4

10 Year Sexual Recidivism Risk Using Static-99R, VRS-SO (Pre), and VRS-SO Change

Static 99R	VRS-Pre	VRS-Change
4	35	3.5

B0	B1	B2	B3
-3.736	0.254	0.059	-0.13

10-Year Predicted Sexual Recidivism = 24.8 %

Clear Prior Values Format Output Return HOME

Two-tailed Confidence Intervals		
	Lower	Upper
95%CI	20.0	30.2
90%CI	20.7	29.3

One-tailed Confidence Level		
	Lower	Upper
95%CI	20.7	29.3
95%CI		29.3
90%CI	21.6	
90%CI		28.3

Samples 4

N = 912

Ready 100%

# VRS-SO Calculator LR Models

- Each sheet indicates the LR model being applied
- Predictor scores from prior use will show by default.
- Click on “Clear Prior Values” to start with a fresh sheet
- Enter new predictor scores (Click on cell or press ‘Enter’)
- Enter new predictor scores → Obtain predicted recidivism and Cis
- Input is limited to predictor score values. Input elsewhere generates an error message.
- From here you may return “HOME”.
- Format output to print or save as a file.

# VRS-SO Calculator Formatted Output

VRS-SO Calculator WI-ATSA - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View Developer Acrobat

Clipboard Font Alignment Number Styles Cells Editing

C1 10 Year Sexual Recidivism Risk Using Static-99R, VRS-SO (Pre), and VRS-SO Change

	A	B	E	F	G	H	I	J	K	L
1	<b>Violence Risk Scale - Sexual Offender version (VRS-SO) Predicted recidivism based on logistic regression.</b>	HOME								
2										
3	Current date: 05/26/2016									
4										
5	Prediction Model: 10 Year Sexual Recidivism Risk Using Static-99R, VRS-SO (Pre), and VRS-SO Change									
6	With a Static-99R score of: 5									
7	and a VRS-SO pretreatment dynamic score of: 29									
8	and a VRS-SO change score of: 1.0									
9										
10	The predicted 10 year recidivism rate = 29.21 %									
11	The 95% confidence interval is 24.32 % to 34.65 %									
12										
13	The applied predictive model is based on logistic regression analysis of 4									
14	aggregated normative samples representing a total N of 913									
15										
16	Sample 1 : Clearwater Sex Offender Treatment Program, Regional Psychiatric Centre									
17	Sample 2 : Kia Marama Special Treatment Unit, New Zealand Department of Corrections									
18	Sample 3 : National Sex Offender Program, Correctional Service of Canada									
19	Sample 4 : Clearwater Sex Offender Program II, Regional Psychiatric Centre									
20	Jeder neue Computerprogramm tut im Grunde eine Aufgabe, die eine Person zu tun pflegten. Aber der Computer in der Regel tut es schneller, genauer gesagt, für weniger Geld und ohne Krankenversicherung Kosten.									
21										
22										
23										
24										
25										
26										
27										

Save Output to File

Print Output

Ready Average: 130.022202 Count: 9 Sum: 1040.177616 100%



# VRS-SO Calculator Formatted Output

- **Formatted output includes:**
  - **Current date**
  - **LR model used**
  - **Predictor scores**
  - **Recidivism estimate**
  - **95% CI**
  - **Normative samples description**
- **Options:**
  - **Return HOME**
  - **Save output to PDF file**
    - Prompted for new file name (default is overwritten)
  - **Print output**
    - Sent to default printer in you computer settings

# VRS-SO Calculator Graphical Output

VRS-SO Calculator 12-14-2015 - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View Developer Acrobat

Clipboard Font Alignment Number Styles Cells Editing

Calibri 11

HOME

Logistic Regression: A primer on computational methods

Predicted 5- and 10-Year Sexual Recidivism Rates Based on Logistic Regression of VRS-SO and Static-99R Risk and Change Scores

5 Year Sexual Recidivism Using VRS-SO Static Only 10 Year Sexual Recidivism Using VRS-SO Static Only

5 Year Sexual Recidivism Using VRS-SO Pretreatment dynamic Only 10 Year Sexual Recidivism Using VRS-SO Pretreatment dynamic Only

5 Year Sexual Recidivism Risk Using VRS-SO Pretreatment Total Only 10 Year Sexual Recidivism Risk Using VRS-SO Pretreatment Total Only

5 Year Sexual Recidivism Risk Using Static-99R and VRS-SO Pretreatment dynamic 10 Year Sexual Recidivism Risk Using Static-99R and VRS-SO Pretreatment dynamic

5 Year Sexual Recidivism Risk Using VRS-SO Pretreatment Total and VRS-SO Change 10 Year Sexual Recidivism Risk Using VRS-SO Pretreatment Total and VRS-SO Change

5 Year Sexual Recidivism Risk Using Static-99R, VRS-SO (Pre), and VRS-SO Change 10 Year Sexual Recidivism Risk Using Static-99R, VRS-SO (Pre), and VRS-SO Change

Predicted 5- and 10-Year Violent Recidivism Rates Based on Logistic Regression of VRS-SO and Static-99R Risk and Change Scores

5 Year Violent Recidivism Using VRS-SO Static Only 10 Year Violent Recidivism Using VRS-SO Static Only

5 Year Violent Recidivism Using VRS-SO Pretreatment dynamic Only 10 Year Violent Recidivism Using VRS-SO Pretreatment dynamic Only

5 Year Violent Recidivism Risk Using VRS-SO Pretreatment Total Only 10 Year Violent Recidivism Risk Using VRS-SO Pretreatment Total Only

5 Year Violent Recidivism Risk Using Static-99R and VRS-SO Pretreatment dynamic 10 Year Violent Recidivism Risk Using Static-99R and VRS-SO Pretreatment dynamic

5 Year Violent Recidivism Risk Using VRS-SO Pretreatment Total and VRS-SO Change 10 Year Violent Recidivism Risk Using VRS-SO Pretreatment Total and VRS-SO Change

5 Year Violent Recidivism Risk Using Static-99R, VRS-SO (Pre), and VRS-SO Change 10 Year Violent Recidivism Risk Using Static-99R, VRS-SO (Pre), and VRS-SO Change

Frequently Asked Questions Model Graphs

Who should I contact if I have questions about scoring the VRS-SO? Model 1 Recidivism Graph

Who should I contact if I have technical questions about using this workbook? Model 2 Recidivism Graph

Can I get a more complete description of the normative samples? Model 3 Recidivism Graph

The samples differ in their base rates. Does this matter? Model 4 Recidivism Graph

Model 5 Recidivism Graph

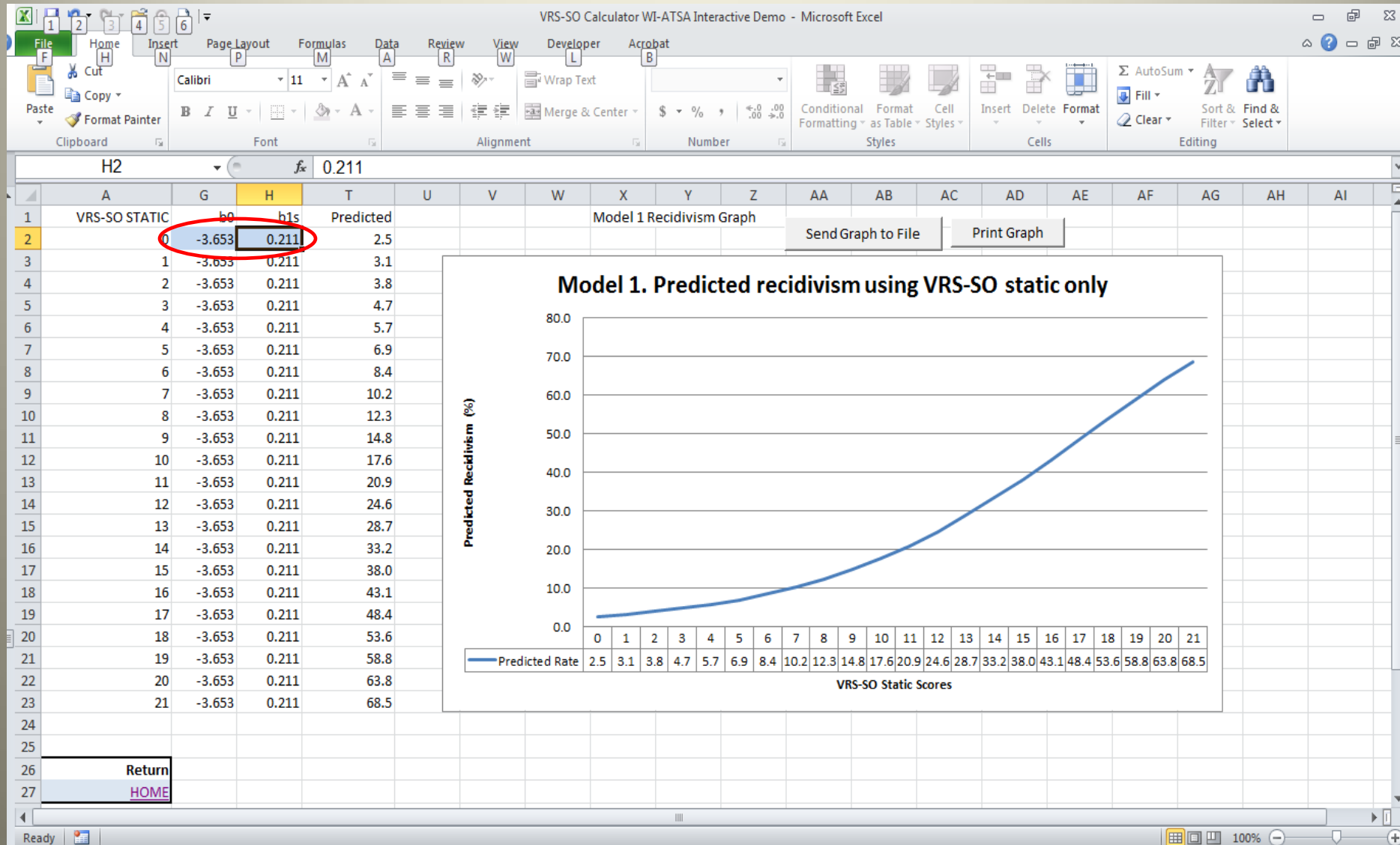
Model 6 Recidivism Graph

Ready 100%

# VRS-SO Calculator Graphical Output

- Graphical output of LR models
- Models 1 – 6 correspond to order clusters above
  - Only difference is the  $B_0$  and  $B_1$  regression coefficients
- Example: 10 year sexual recidivism using VRS-SO Static scores only
  - $B_0 = -3.653$ ;  $B_1 = 0.211$ ;
- ONLY cells shaded in blue can be changed. Predicted 10 year sexual recidivism rates are shown for all VRS-SO static scores
  - Models with multiple predictors are a little more complicated.
- HOME, Save to file, and Print work the same as the formatted output

# VRS-SO Calculator Graphical Output



# VRS-SO Calculator Other Features

VRS-SO Calculator 12-14-2015 - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View Developer Acrobat

Clipboard Font Alignment Number Styles Cells Editing

AutoSum Fill Clear Sort & Filter Find & Select

A1	HOME			
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6	<a href="#">5 Year Sexual Recidivism Risk Using VRS-SO Pretreatment Total Only</a>			
7	<a href="#">5 Year Sexual Recidivism Risk Using Static-99R and VRS-SO Pretreatment dynamic</a>			
8	<a href="#">5 Year Sexual Recidivism Risk Using VRS-SO Pretreatment Total and VRS-SO Change</a>			
9	<a href="#">5 Year Sexual Recidivism Risk Using Static-99R, VRS-SO (Pre), and VRS-SO Change</a>			
10				
11	<b>Predicted 5- and 10-Year Violent Recidivism Rates Based on Logistic Regression of VRS-SO and Static-99R Risk and Change Scores</b>			
12	<a href="#">5 Year Violent Recidivism Using VRS-SO Static Only</a>			
13	<a href="#">5 Year Violent Recidivism Using VRS-SO Pretreatment dynamic Only</a>			
14	<a href="#">5 Year Violent Recidivism Risk Using VRS-SO Pretreatment Total Only</a>			
15	<a href="#">5 Year Violent Recidivism Risk Using Static-99R and VRS-SO Pretreatment dynamic</a>			
16	<a href="#">5 Year Violent Recidivism Risk Using VRS-SO Pretreatment Total and VRS-SO Change</a>			
17	<a href="#">5 Year Violent Recidivism Risk Using Static-99R, VRS-SO (Pre), and VRS-SO Change</a>			
18				
19	<b>Frequently Asked Questions</b>			
20	<a href="#">Who should I contact if I have questions about scoring the VRS-SO?</a>			
21	<a href="#">Who should I contact if I have technical questions about using this workbook?</a>			
22	<a href="#">Can I get a more complete description of the normative samples?</a>			
23	<a href="#">The samples differ in their base rates. Does this matter?</a>			
24				
25				
26				
27				

Ready 100%

# **VRS-SO Calculator Other Features**

- **Refresher of logistic regression concepts**
- **Frequently Asked Questions**

**Interactive Demonstration or Questions**