

Depression & Multiple Sclerosis

Research Example

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Example - Outline

- * **Introduction**
 - * Depression & MS
- * **Research Question?**
- * **Hypotheses**
- * **Study Design**
- * **Tools/Variables**
 - * **Beck Depression Inventory (BDI)**
 - * BDI-II
 - * BDI-Fast-Screen (BDI-FS)
 - * **EDSS**
 - * **Relapses**
 - * **Demographics**
- * **Collection of Data/SPSS**
- * **Sample Size & Power**
- * **Non-Normal vs. Normal Distribution**
- * **Results**
 - * **Descriptive statistics**
 - * **Pearson correlation**
 - * **Chi-Square**
 - * **Discussion**
 - * **Strengths & Limitations**

Background

- * Major depressive disorders and suicide are highly common in MS
- * Despite the high prevalence, only half of patients are screened
- * Depression and Suicide ideation often remain undetected



Vincent Van Gogh's 1890 painting
"At Eternity Gate"

Depression & Multiple Sclerosis

- * MS is a progressive inflammatory disease
- * Depression is a chronic disease
- * Upregulation of pro-inflammatory cytokines
- * Questionable relationship between depression & progression of MS
- * Studies have shown conflicting results regarding the relationship between depression and progression of disease
- * Cause & effect relationship is questionable
- * Chicken-Egg phenomenon:

* Depression ↔ MS

The magnitude of Depression & Suicide in MS

- * **The lifetime prevalence of major depression among individuals with MS is 50%**
- * **Untreated depression can lead to**
 - * **1) Immune dysregulation associated with MS**
 - * **2) Significant social and functional impairments**
 - * **3) Suicide - 7.5 times higher than in the general population**

Research Question?

- * **Define the question simply and clearly identify the dependent variable (outcome) and the independent variables (variables leading to the outcome)**
- * **What is the relationship between Depression & MS as measured by the Expanded Disability Status Scale and relapse rate?**
- * **May add other variables – MRI disease or others for example Optic Coherence Tomography (OCT)**

Study Hypotheses

* Null Hypothesis

- * There is no relationship between depression & MS
- * There is no difference between the BDI-II and the BDI-FS

* Alternate Hypotheses

- * There is positive or negative relationship between depression and MS
- * People who had low or high level of depression as measured by the BDI will have different MS disease based on the EDSS and relapse rate
- * There is a difference between the BDI-II and BDI-FS in identifying depression

Conceptual Framework: Behavioral-cognitive Theory

- * **Major life stressors can result in depressive disorders**
- * **Mobilization of support from family and support networks may result in a negative feedback and reinforcement of a depressive behavior**
- * **Depression is mediated by environmental stimuli and by the individuals' attendance to stimuli**
- * **Biological/organic etiology for depression**

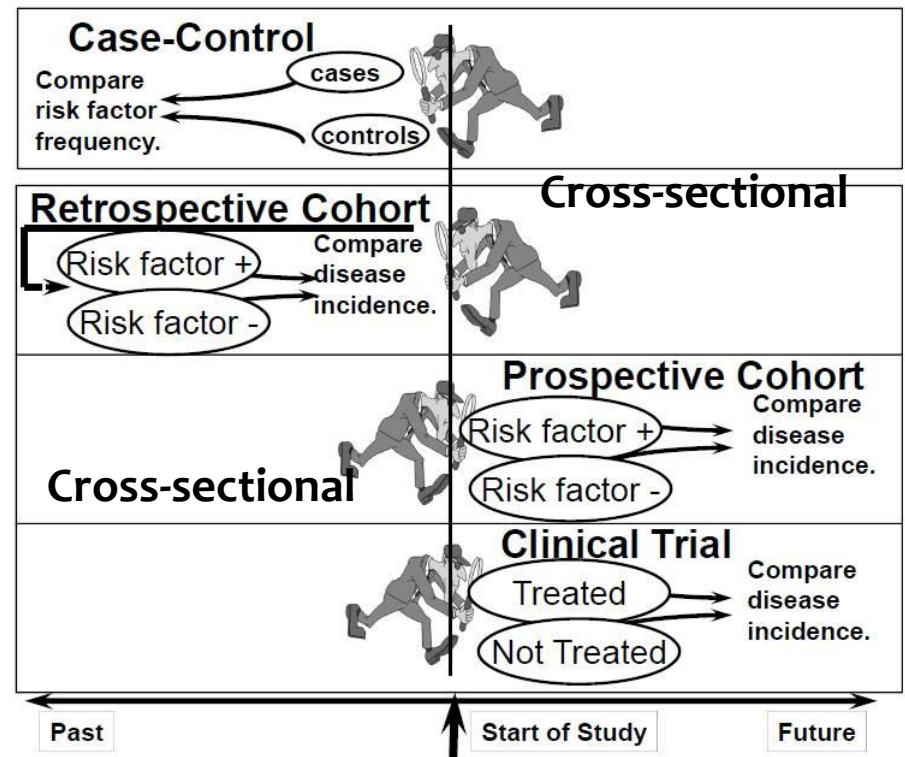
Davidson et al., 2004; Lovejoy & Matteis, 1997

Study Design

- * **Correlational descriptive**
- * **Cross-sectional study**
 - * **Assessing BDI-II & BDI-FS, EDSS & Relapse rate once during the study**
 - * **One point assessment**
- * **Dependent Variable**
 - * **MS disease level**
 - * **EDSS (Ordinal Scale & as categorical)**
 - * **Number of Relapses**
- * **Independent Variable**
 - * **Depression (BDI)**
 - * **Numerical**
 - * **Categorical**

Methods

- * Cross-sectional study
- * Convenience sample
- * Small sample size n=34
- * Statistical methods
 - * Descriptive statistics
 - * Spearman correlation
 - * Logistic regression



Instruments

- * Beck Depression Inventory – II (BDI-II)
- * Beck Depression Fast Screen (BDI-FS)
- * Expanded Disability Status Scale (EDSS)
- * Number of Relapses based on chart review and demographic sheet data

The Beck Depression Inventory (BDI)

* Sadness

- * 0. I do not feel sad.
- * 1. I feel sad much of the time.
- * 2. I am sad all the time.
- * 3. I am so sad or unhappy that I can't stand it.

* Suicidal Thoughts or Wishes

- * 0. I don't have any thoughts of killing myself.
- * 1. I have thoughts of killing myself, but I would not carry them out.
- * 2. I would like to kill myself.
- * 3. I would kill myself if I had the chance.

Collection of Data

- * **Consent form**
- * **One point data collection**
- * **One follow up visit**
- * **Input data into SPSS**
- * **All patients data collected from one large MS Center**

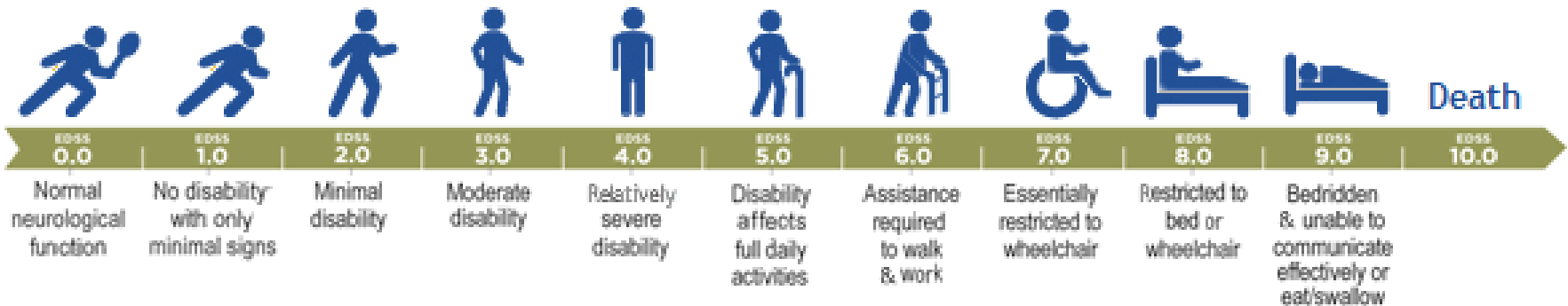


Definition of Variables

- * **EDSS** = EDSS \leq 4 - Mild & moderate disability
 - * EDSS change by 1 point on the scale
- * **Relapse** = Number of relapses (acute attacks)
- * **BDI** = Depression measured by the Beck depression Inventory
 - * BDI as categorical variable
 - * BDI-II - + depression \geq 14
 - * BDI-FS - +depression \geq 4
 - * BDI as ordinal variable

Expanded Disability Status Scale (EDSS)

The Expanded Disability Status Scale (EDSS)



EDSS ≤ 4 = Ambulatory; Mild to moderate disability

EDSS > 4 = Increased disability requiring assistive device to walk or wheelchair

Relapse Rate

- * **Number of Relapses**
 - * Number of relapses in 1 year
 - * Number of relapses in 3 years
- * **This study assessed number of relapses not severity of relapses**

What Is an MS Relapse?



Other Independent Variables

- * **Age**

- * **Gender**

- * **Ethnicity/race**



- * **Education level**

- * **Work**

- * **Marital status**

- * **Living alone or with others**

- * **Type of MS**

- * **Type of DMT**

- * **Smoking**

- * **Alcohol**

- * **Vitamin D**



Sample Size & Power

- * A Power level chosen is 80%
- * A level of significance of 0.05
- * Distribution & type of variables
- * G-Power software (free download) helps you to calculate sample size
- * <http://www.gpower.hhu.de/>

Questions:

How large should my sample be?

Answer:

It depends...

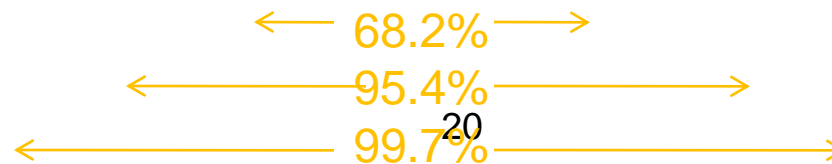
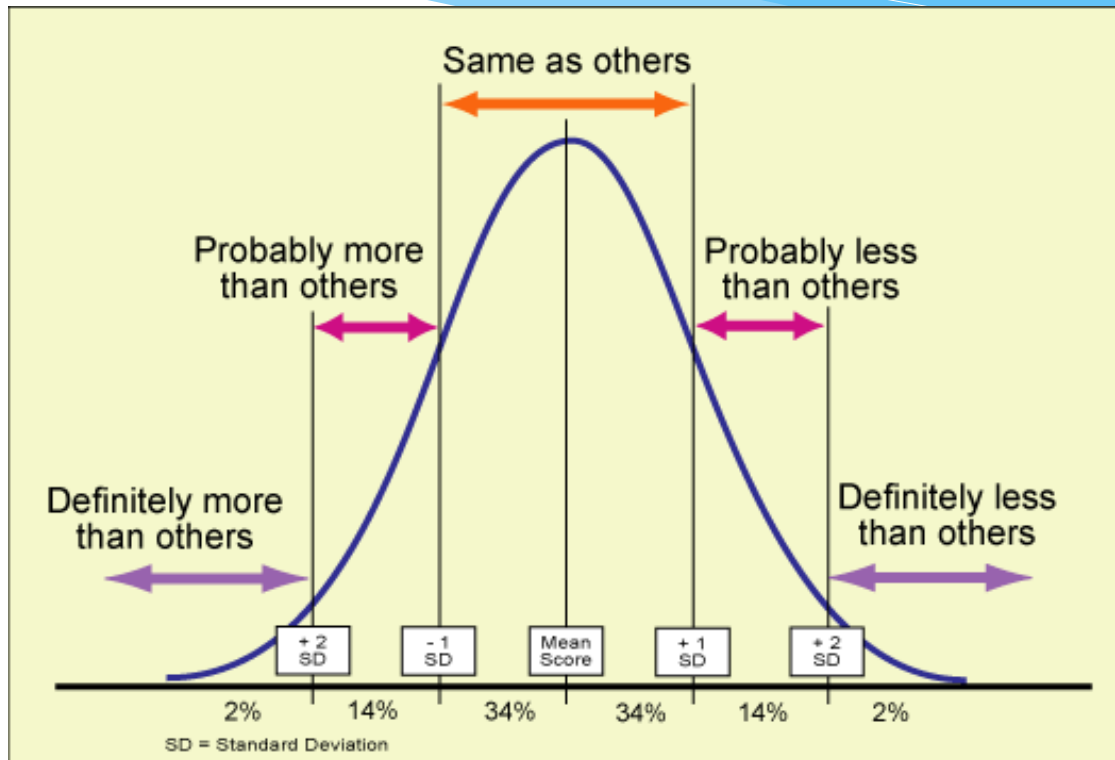
...large enough to be an accurate representation of the population
...large enough to achieve statistically significant results



Normal Distribution

- * Normal distribution – the variable parameters are around the mean for example +2 and -2 from the standard deviation
- * Standard deviation – the distance of the result from the mean for example the BDI value of all the participants around the mean or a very heterogenic group
- * You need to check the distribution of your results before deciding upon statistical tests to use in your study

Normal Distribution



Statistical analysis

- * Think about the appropriate statistical tests for the distribution
 - * Normal distribution – comparing between the mean of different groups – Parametric tests: ANOVA, ANCOVA, T test, Regression
 - * Non-Normal distribution – comparing between the median of different groups – Non Parametric tests: Kruskal Wallis, Mann-Whitney, Chi Square, Regression

Statistical Analysis

- * Think about the appropriate statistical tests for the different type variables
- * Interval or Ratio variables – Pearson correlation
- * Ordinal & interval variables – Spearman correlation
- * Categorical 2 x 2 table – Chi Square analysis
- * Multi-categorical – Kruskal Wallis & Mann-Whitney
- * Categorical variables – Logistic regression for dependent categorical variable – dichotomous or multinomial

Results: Sample Demographics

- * **N = 34 subjects with MS (85% RRMS)**
- * **Mean age 41.6 (SD – 12.5, R = 19-74)**
- * **88.3% had college or postgraduate education**
Mean yrs education 16.7 (SD – 2.8, R = 10-23)
- * **70.6% Female**
- * **73.5% Caucasian**
- * **67.6 % Married or lived with partner or family**
- * **70.6% worked full time**

Results: Depression Prevalence

- * There was a significant positive correlation between the BDI-II and BDI-FS ($r = .82, p = .01$)
- * The prevalence of depression as assessed by the Beck Depression Inventory-II (BDI-II) was 15% with two subjects identified as having major depression, compared to 21% as measured by the Beck Depression Inventory Fast-Screen (BDI-FS) with three subjects identified as having major depression

Results: Correlation between Depression & Disability/Relapses

- * The BDI-FS identified significantly more depressed persons than the BDI-II ($X^2 = 22.61$, $df = 1$, $p < .001$)
- * There was no correlation between the extent of disability or number of MS relapses and depression as measured by either the BDI-II or BDI-FS
- * The study supports the ability of both tools to identify depressive symptoms among individuals with MS

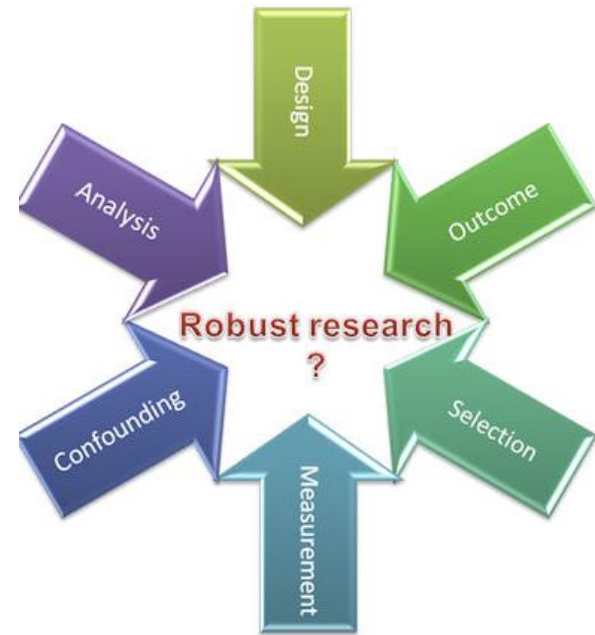
Strengths of the Study

- * **Multiple variables / confounders**
- * **Different statistical analyses**
- * **Sample size**
- * **Similar demographic characteristics as the general MS population**
- * **Potential generalizability of the study**
- * **Basis for future study – Prospective Cohort**



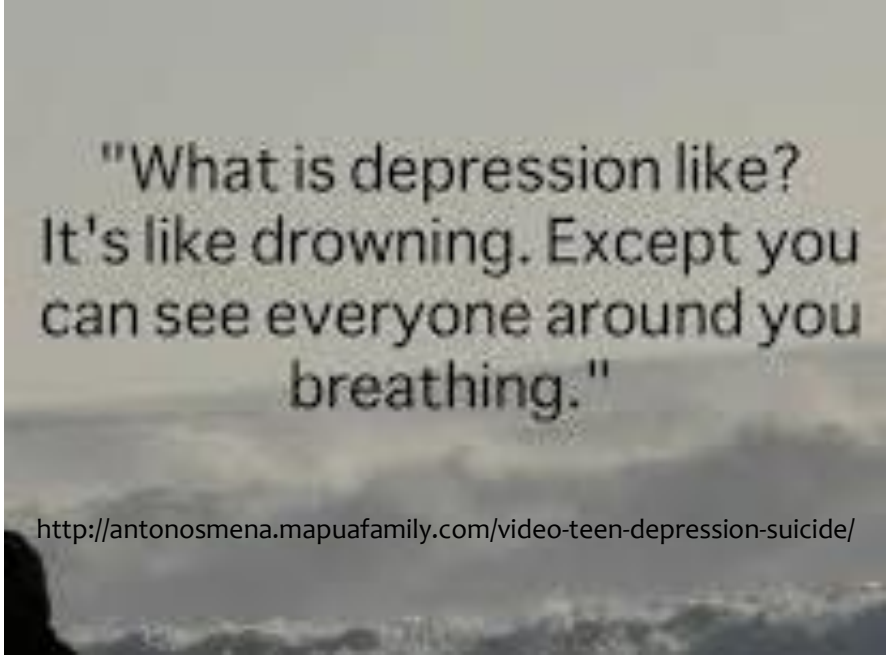
Limitations of the Study

- * **Cross-sectional study**
- * **The EDSS calculation is based on one point of study**
- * **Selection bias of participants**
- * **Onset of disease not correlated with BDI testing but may control for duration of disease**



Conclusions

- * Depression, appetite changes, sadness and loss of pleasure are determinants of suicide in MS
- * Early screening is critical in clinical practice
- * Larger studies are warranted to show the associations



"What is depression like?
It's like drowning. Except you
can see everyone around you
breathing."

<http://antonosmena.mapuafamily.com/video-teen-depression-suicide/>

Thank You!



Cats are natural
Antidepressants

Lucy & Max

Side effects:
chewed
furniture,
allergies,
sleepless nights,
scratches, and
furry house

Thank You!