

# Single case design

Design



Analysis of a Single Case Design Identify Dependent Variable The dependent variable In this single-case design Is hypertension In adults and involves monitoring blood pressure readings. Hypertension is the medical term for high blood pressure. Blood pressure is the force of blood pushing against the walls of the arteries as the heart pumps out blood (National Institute of Health, 2012). High blood pressure is a serious medical condition because it causes the heart to work harder. It is particularly dangerous because it often has no warning signs or symptoms.

Blood pressure Includes systolic and diastolic pressures; both numbers In a blood pressure test are Important (National Institute of Health. 2012). The systolic pressure is the force of blood in the arteries as the heart beats while pumping blood. It is shown as the top number in a blood pressure reading (National Institute of Health, 2012). The diastolic pressure is the force of blood in the arteries as the heart relaxes between beats. It is shown as the bottom number in a blood pressure reading (National Institute of Health, 2012).

The higher the diastolic blood pressure the greater the risk for heart attacks, strokes, and kidney failure (National Institute of Health, 2012). In this single-case design, the diastolic reading will be charted. There is no cure for high blood pressure, however it can be prevented and/ or controlled. Individuals at risk for developing high blood pressure are the overweight, those that have a family history of high blood pressure, and those with prepossession. The categories for blood pressure levels in adults are normal, prepossession, stage one hypertension, and stage two hypertension (National Institute of Health, 2012).

A normal level involves a systolic reading less than 120 and a diastolic reading less than 80. The prehypertension level involves a systolic level of 120-139 or diastolic level of 80-89. Stage one hypertension level is determined by a systolic level between the ranges of 140-159 or a diastolic level between the ranges of 90-99. Stage two hypertension is indicated by a systolic level greater than or equal to 160 or a diastolic level greater than or equal to 100 (National Institute of Health, 2012).

**Identify Subject** The subject in this single-case design is a single 50-year-old graduate student. This individual is an African American female that has recently been diagnosed with high blood pressure. Her doctor has prescribed medication for this condition in which she is compliant in taking on a daily basis. This subject does not have any other medical conditions or health issues with the exception of being overweight. However, she does smoke cigarettes and drinks alcohol socially. The subject is energetic and but lacks physical activity.

She is employed full-time and attends college part-time in the evenings. There is a history of high blood pressure in the family; both parents and two siblings have also been diagnosed with this condition. Choose a

**Measurement or Instrument** The chosen instrument used in this design which assesses and measures the change in blood pressure readings is a digital home blood pressure monitor indicator. This unit is simple to use and has a large digital readout that is easy to appropriately fit the subjects' size.

It measures the systolic and diastolic pressure, the pulse, and records the date and time when the pressure is taken. A blood pressure monitor is a

valid and reliable instrument that isolates the dependent variable of this single-case design. This instrument will be used twice a day and the measurement will be recorded after each reading. The variability of the readings will be collected and compared to the baseline. Define Treatment Protocol The method of intervention to be used in this design is the implementation of exercise on a daily basis.

Exercising makes the heart stronger; a stronger heart can pump more blood with less effort. Exercise is also beneficial for losing weight, which is another important way to control blood pressure. The subject in this design will walk on a treadmill every morning before leaving for work. The goal is for the subject to walk for at least thirty minutes a day in this single-case design. Normally, she lacks any physical activity, therefore she will start by walking ten minutes a day for the first week. The second week of treatment, her walk will increase to twenty minutes a day.

During the third and final week of this design, she will begin the thirty minute walk, five days a week. Hopefully a significant decrease in her blood pressure and weight will be achieved as a result of treatment. This would definitely be a motivating factor for her to continue this regimen daily.

Define a Design Phase Protocol The phase of design used to monitor and compare the variation in blood pressure will be by an A-B-A design. The initial (A) in this design involves establishing a baseline by consistently monitoring the subjects' blood pressure twice a day, recording the reading and graphing the results on a chart.

This phase will be done for seven days before progressing to the next phase but only four readings will be used in the establishment of the baseline. The (B) in this design denotes the introduction of treatment, which entails increasing the subjects' physical activities. The treatment phase involves exercising daily by walking on a treadmill. The subjects' blood pressure will be annotated for comparison on the same graph for two weeks. The following (A) in this design indicates the follow up phase and removal of the treatment. The subjects' blood pressure will continue to be monitored, recorded, and graphed.

Afterwards, the variability in blood pressure readings will be compared and the results will yield an evidence based conclusion in determining the effectiveness and the impact of exercise regarding an individuals' blood pressure. Establish a Baseline The baseline phase of this design involved checking the blood pressure at the same time each morning and every evening before getting into bed. There was no hang in the subjects' daily routine and no treatment implemented during this period. Instructions were provided and followed on how to take the blood pressure properly to ensure the best results.

This not only involves checking the blood pressure at the same time each day, it includes taking the blood pressure while sitting in the same chair and using the same arm. The blood pressure fluctuates throughout the day for various reasons. For example, eating, any physical activity, during the establishment of a baseline in this single-case design, being consistent in aging the blood pressure each morning upon rising was done in order to

eliminate any factors that may influence or distort the measurements. The results were collected and recorded for one week. Table 1.

Initial Phase Protocol for Single Case Design Baseline - Phase A treatment  
 Intervention - Phase B 10-30 min of exercise 5 days per week Follow up -  
 Phase A No No treatment Week weeks 2-3 Week 4 Implement Phase Protocol  
 and Measure at Multiple Observation Points During the implementation of  
 each phase in this A-B-A design, the data was collected at multiple points.  
 Blood pressure readings were measured at home, twice a day over a four  
 week period. This single-case design yields the results of the five highest  
 diastolic readings each week and displays 20 data collection points.

Table 2 displays the multiple data points, reveals a change in the dependent  
 variable and illustrates the variability of the readings in the data collected.

Table 2. Final Phase Protocol and Data for Single Case Design Daily 1 23 45 6

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Intervention	N	N	N	N	N	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Diastolic	90	93	93	95	94	101	97	99	96	93	92	93	96	95	94	85	88	85	86	83

86 83 Data Analysis Table 3 provides a visual analysis of the level, trend, and  
 variability of the collected data at each phase in this design.

As can be seen in the graph, the subjects' diastolic blood pressure reading  
 reveals the level was relatively high at each phase and eventually decreased  
 once treatment was removed. In Phase 1, the level was 93 (mean of Week  
 1); in Phase 2, the level was 95. 6 (mean of Weeks 2-3); and in Phase 3, the  
 level was 85. 4 (mean of Week 4). The trend of the data indicates an  
 increase in the diastolic pressure during the weeks of intervention. There is  
 also a noticeable amount of variability throughout each phase.

The treatment phase implies that exercise causes a temporary spike in the blood pressure readings. However, the eventual decrease in level indicates that in time, exercising can actually decrease an individuals' blood pressure overall. The benefits of exercising are not limited to lowering the blood pressure. Other benefits derived from exercising can include a stronger heart, increased metabolism, and a youthful appearance. All of the aforementioned factors are important in self-care and can contribute to a healthier and happier disposition.