

Can Multilingualism and Positive Visualizations Influence Resilience?

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### **Abstract**

The ability to overcome life's challenges and to thrive as a result is humanity's number one desired outcome. Resilience leads to happiness, prosperity, peace and inner equilibrium. Studies about individuals demonstrating resilience are therefore of great utility. An experiment was undertaken to find out whether multilingualism and positive visualizations of having overcome stressful events could positively influence resilience, as measured by the dependent variable of heart rate increases in beats per minute. This experiment involved 120 female 18- and 19-year old undergraduate volunteers recruited from a prestigious American undergraduate university. Items from the Holmes and Rahe Stress Inventory (Christie-Seeley, 1983) were read to participants, and their heart rates were recorded prior to testing and immediately after. Results showed that the quasi-independent variable (number of languages spoken fluently) did have a relation to heart rate changes. The second independent variable (how the inventory items were read to the participants) demonstrated a causal effect. The experiment presented numerous limitations, including the inability to ascertain whether or not the sample group varied too much from the general population. Future experiments could investigate whether certain inventory items demonstrated greater disparities in heart rate increases between groups. Fluency in languages further removed from English, i.e. non-Germanic and non-Romance languages might point to increased resilience, and therefore could be an interesting and useful possible correlation to study in the future.

### Can Multilingualism and Positive Visualizations Influence Resilience?

The study of psychological resilience is one which has interested psychologists, sociologists, counselors, clinicians and researchers for decades. Resilience is one of the most desired traits a human can possess: an integral facet of a psychologically healthy, balanced and happy individual. According to Ong, Bergeman and Boker (2009, p. 1777) the term resilience "refers to a pattern of functioning indicative of positive adaptation in the context of significant risk or adversity." Alongside this definition is the understanding that for an individual to be considered resilient, they must be exposed to significant risk and that a positive adaptation must occur following the stressful event. The idea behind this paper is that if resilience were better understood, steps could be taken to teach and encourage resilience in the general population, thus better equipping people to be happier, more productive, and more peaceful, functioning members of society. Heightened resilience amongst the general population could lead to a decreased dependency on anti-depressants and anti-anxiety medication, decreases in episodes of self-harm, domestic violence and loss of human potential due to depression crime and poverty. Last but not least, increased wellness could save the government funds through decreased levels of public assistance to depressed and anxious individuals.

Previous research on resilience has not brought researchers any closer to a full consensus on whether it is a product of nature or nurture. This said, researchers have concluded on a small number of possible explanations or theories as well as a number of variables which appear to coexist in highly resilient individuals. For example, Jacelon (1997, p. 126) cites the work of Wagnild and Young (1990) who together identified the following themes emerging from their studies on resilience: "(a) equanimity, (b) perseverance, (c) self-reliance, (d) meaningfulness and (e) existential aloneness." The latter term refers to a person's strongly held belief that they are a

unique individual on this planet, and therefore a person of great worth. Jacelon (1997, p. 126) also cited the work of Flach (1980, 1988) who concluded that resilience is a belief system which can be learned at any point in life – thereby disagreeing with those who believe that it can only come about from difficulties experienced in early life. Rutter (1985) as cited by Jacelon (1997) is of the opinion that resilience does not improve by an avoidance of stressful situations. Instead, it increases through the individual learning how to face stressors head on with self-confidence and social competence. This concept of an entire group of life events influencing a person's ability to withstand adversity throughout a lifetime is in line with most of the research conducted on this subject. Rutter (1985) also contends that resilience and vulnerability exist on opposite ends of a scale, i.e. the more resilient one is the less vulnerable one is. This point of view, however, contradicts research by Brown (2012), who contends that vulnerability is a measure of strength and not of weakness.

The idea to use positive visualizations as an independent variable stems from the idea that resilience requires the confidence to believe that one can overcome the obstacle at hand (O'Brien, 2016). This links to the work of Rizzolatti. Along with his colleagues, he stumbled upon unique neurons in the frontal and premotor cortex while doing research on "the neural representation of motor movements in monkeys" (Rizzolatti & Fabbri-Destro, 2010). Rizzolatti's work was of great influence in the field of positive psychology. His research demonstrated that humans learn thanks to their ability to imitate others' actions in a sort of "monkey see, monkey do" manner. Even more importantly, researchers found that when a person witnesses another person doing something, the mirror neurons in the inactive person are stimulated in the exact place the brain is stimulated in the brain of the person performing the same task. Furthermore, the mirror neurons in the inactive person will even be stimulated (or "fired up") in that same part of the brain if they even think of

the other person doing the activity in question. Newmark (2012) explains how this idea of mirror neurons was then taken a step further by sports psychologists. Advances in performance through visualization training, most notably starting with the 1984 Olympics, occurred when "Russian researchers studying Olympic athletes found that Olympians who had employed visualization techniques experienced a positive impact on their biological outcomes and performance" (Newmark, 2012, p. 385).

The idea that the more languages one speaks the more resilient one is appears to be a new one. In fact, no peer-reviewed data linking multilingualism to an increased ability to handle life's stressors with resilience was found for the preparation of this paper. This is despite the fact that multilingualism is only possible thanks to great adaptations in the brain. According to Bialystok (2011), to learn a new language an entire set of words, cultures and customs must not only be learned but kept updated alongside the with the individual's primary, secondary, or tertiary language(s). In addition, multilingualism coexists with multiculturalism, which by definition is the ability to hold in place several (sometimes competing) groups of mores, beliefs, and customs. Since resilience is the capability to adapt to consequent and often traumatic stressors in life, it seemed logical to create an experiment to find out if there was a relationship between multilingualism and resilience. Increases in heart rates per minute were chosen as the dependent variable because heart rate is a common physiological manifestation of psychological stress and anxiety (MacIntyre, MacIntyre and Carre , 2010).

In this study, I expect to find that the more languages a participant speaks, the less their heartbeat will go up when imagining stressful life experiences. I also expect participants who are asked to imagine themselves already having overcome highly stressful events through the soon-to-be patented ALERTS training (the Amazing Lopez-Escobar Resilience Training System) to show

a lower average heart rate increase than those who imagine themselves being in the throes of a difficult situation.

## **Method**

### **Participants**

The search for volunteers for the study started one month before the experiment with an advertisement in New York University's college newspaper. The volunteer selection required students to fill out a questionnaire in which they had to self-report (with a "Yes" or a "No") whether or not over the past 3 years they had experienced any of the life events from the Holmes and Rahe Stress Inventory (see Appendix n° 1). Potential participants were also asked to self-report which languages they were fluent in.

Only female participants were allowed to volunteer for the experiment to decrease male-female differences in participants' reactions and their interpretation of emotional events (regardless whether this discrepancy is caused by nature or nurture). Undergraduate students who were 18 and 19 were selected because the younger one is, the less one is likely to have experienced some of life's greatest stressors. This was also to prevent significant variations in the age and or maturity of participants, which might influence test results. Only potential volunteers who filled the gender and age requirements and who had not experienced any of the items on the survey over the past three years were retained for the study. Monolingual students who had no knowledge of any foreign languages whatsoever were favored over students who had achieved semi-fluency, in order to avoid using too many participants who were quasi fluent. After tallying the answers, the research team saw that 130 volunteers qualified and were therefore invited back for the experiment.

### **Materials and Procedure**

The location for the study was New York University because it has the highest percentage of international undergraduate students as per Times Education World University Rankings 2015-2016, thereby increasing the pool of multilingual students who could participate in the study. Researchers created a 1-month window between the date at which potential participants filled out the original forms and the experiment itself in order to prevent students from remembering what was on the original intake form the day they showed up for the experiment. The study was scheduled to start at 2 in the afternoon and to finish at 5 pm. This timing also decreased the potential influence of caffeine, which in the United States tends to be consumed primarily in the mornings. The test was conducted after the first three weeks of the semester and before the last three weeks of final exams, also to decrease the chances that outside influences and stressors would render participants overly anxious.

Although the instructions for taking the Holmes and Rahe Stress Inventory require test-takers to report whether or not they had experienced any of the items over the past year, for the purpose of this study potential participants were asked whether or not they had experienced any of these items over the last three-year period. This was because researchers did not want personal memories to unduly influence their reactions to the items read to them during the experiment. Only life events corresponding to 29 points or over were retained for the questionnaire because it was deemed that items corresponding to or below 28 points would not have left lasting emotional memories and therefore would not be sufficiently emotionally charged to exclude potential participants from the study. Items were presented randomly and therefore not in increasing or decreasing order.

The research team wanted to exclude as many participants who were currently experiencing depression because they believed that it might reduce their ability to imagine positive outcomes. To this end, when the volunteers came in for the study they were offered a hot drink while they waited and were asked to fill out one last questionnaire, the Beck Depression Inventory (Stulz & Crits-Christoph, 2010). Ten students were thus precluded from the study and were referred to NYU's counseling center. This brought the number of participants down to 120.

To avoid any discrepancies in the interpretation of the words "language fluency," the language proficiency definitions of the US Department of State were used in the original volunteer search (see Appendix n° 2). Out of the 120 volunteers on the day of the Resilience Experiment, one quarter of the participants retained were English speakers who did not speak any other languages whatsoever, and were placed into Group "A." One quarter were bilingual and went into Group B, one quarter were trilingual and made up of Group C, and one quarter were quadrilingual and went into Group D. Each of the four groups of 30 students were then randomly subdivided into two groups of 15 participants each – thereby creating a total of 8 subgroups (Groups A1, A2, B1, B2, C1, C2, D1 and D2). To further ensure parity between the groups, participants speaking non-Romance and non-Germanic languages were equally distributed. Coincidentally, participants speaking non-Romance and non-Germanic languages came in pairs: there were four Japanese-speaking women, two who spoke Arabic, four who spoke Persian and six who spoke Russian.

After each one of the 120 students had been given a short explanation on the goal of the research which was explained as "searching for ways in which we can teach students how to deal with life better," they were asked to sign consent forms. All 120 participants agreed to sign the forms and were therefore able to participate. So as to expedite the process and to keep students



waiting for as little as possible, 16 assistant researchers were co-opted for the experiment, each being in charge of testing 7 or 8 students. The research team was concerned that female participants might react differently to male research assistants, especially since they were asking the women to sit in a room with a door closed and to put a blindfold on in front of the researchers. As it would not have been in agreement with the Equal Employment Rights laws to discriminate against male research assistants, the research team decided to divide the males into two groups, ensuring that Groups A1, B1, C1 and D1 were interviewed by as many male researchers as A2, B2, C2 and D2. As there were 43 items on the full Inventory and researchers asked participants to spend 30 seconds imagining each scenario, it took an average of 30 minutes to test each undergraduate from start to finish, including the time it took to put the heart rate monitor on and to take it off. 15 students were given the first scheduled intake at 2 pm, with eight groups of students scheduled in every consecutive half hour for the next 4 hours.

As per the experiment itself, students were called into one by one into a room with a researcher and were invited to sit in a comfortable chair. No music was being played in the background nor were there any particular smells incorporated into the experience, to not exert any undue influence on the participants' experience. Research assistants were given a stopwatch, a clipboard with the Holmes and Rahe Stress Inventory items (already randomized), a script and a pen, and were seated next to the participants in a chair which was identical in comfortability and height as that of the student. Both male and female research assistants wore the same thing: a white lab coat over a pair of jeans, and sneakers. White lab coats were used in order to make the experiment look more "clinical" and to put the female participants at ease when spending half an hour with a blindfold on along with a male research assistant in a room with the door closed. Researchers were instructed first to help the students put on the heart monitor and then to invite

the volunteers to put on their eye mask. The participants were told that all they had to do for the experiment was to "listen to words and give in to their imaginations."

In groups with a "1" in the name (Groups A1, B1, C1 and D1) participants were read the series of items and each time were prompted, with a pre-written script, to spend 30 seconds imagining themselves experiencing that stressor as if it were happening at that same moment. In groups with a "2" in the name (Groups A2, B2, C2 and D2) participants were read the same series of items, in the same order, and each time were prompted to spend 30 seconds imagining themselves having already overcome that stressful event and having thrived as a result. Two independent variables were therefore used for in this 2 x 4 factorial design, the quasi-independent variable of language proficiency and the independent variable of whether or not participants were asked to imagine themselves overcoming a stressful event or not.

### **Results**

The findings are shown in Appendix n° 3 and list the compilation of the raw data gathered during the experiment. Pre-test average heart rates, during test average heart rates, and average heart rate differences for all eight groups are listed. The average heart rate differences are shown plotted on Appendix n° 4. The dependent variable is the difference between average heart rate in beats per minute when measuring participants before the experiment and immediately after. As the two variables showed an eventual intersection on a scatterplot of average increases in heart rates expressed in beats per minute, they are said to have a significant interaction.

### **Discussion**

The findings of this experiment support the original hypothesis. The manner in which participants imagined an event did, in fact, affect the dependent variable. The findings also support the hypothesis that the more languages a participant speaks, the less they are affected

physiologically by thoughts of stressful experiences. Previous research not having been found on a link between positive visualization and resilience nor between multilingualism and resilience, this experiment can neither support nor negate previously published findings.

There were many limitations to this experiment. Firstly, only females were used, thereby excluding the male experience, which might be different. As only 18 and 19 year-olds were used, it could be that resilience is related in a different manner in either children or older adults. It could also be that the population of New York University is disproportionately made up of undergraduate students who are multilingual in languages spoken in countries where resilience is more part of the cultural make-up than it is in other countries. It could also be that participants who took the test at the beginning of the afternoon (at 2 o'clock) had not only lower heart rates to start with but a smaller increase in heart rate mainly due to their post-lunch digestive process. Choosing only undergraduate students could mean that a population of academic over-achievers and therefore of unusually resilient individuals participated.

Future directions could include studying the data by breaking it down per item (some items could be more or less immune to either the independent variable or the quasi-independent variable). Furthermore, as researchers now possess information on which languages the bilingual, trilingual and quadrilingual students are fluent in, further correlations between resilience and language might arise from this data. Last but not least, the findings of this experiment could be used to promote language learning.

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# Holmes and Rahe Stress Scale

as copied from: Christie-Seely, J. (1983, March). Life Stress and Illness: A Systems Approach. *Canadian Family Physician*, 29, 533-540. Retrieved December 8, 2016.

## Appendix n° 1

Life event	Life change units	Life event	Life change units	Life event	Life change units
Death of a spouse	100	Change in financial state	38	Change in working hours or conditions	20
Divorce	73	Death of a close friend	37	Change in residence	20
Marital separation	65	Change to different line of work	36	Change in schools	20
Imprisonment	63	Change in frequency of arguments	35	Change in recreation	19
Death of a close family member	63	Major mortgage	32	Change in church activities	19
Personal injury or illness	53	Foreclosure of mortgage or loan	30	Change in social activities	18
Marriage	50	Change in responsibilities at work	29	Minor mortgage or loan	17
Dismissal from work	47	Child leaving home	29	Change in sleeping habits	16
Marital reconciliation	45	Trouble with in-laws	29	Change in number of family reunions	15
Retirement	45	Outstanding personal achievement	28	Change in eating habits	15
Change in health of family member	44	Spouse starts or stops work	26	Vacation	13
Pregnancy	40	Beginning or end school	26	Major Holiday	12
Sexual difficulties	39	Change in living conditions	25	Minor violation of law	11
Gain a new family member	39	Revision of personal habits	24		
Business readjustment	39	Trouble with boss	23		



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### Language Proficiency Definitions

Proficiency Code	Speaking Definitions	Reading Definitions
0 - No Practical Proficiency	No practical speaking proficiency.	No practical reading proficiency.
1 - Elementary Proficiency	Able to satisfy routine travel needs and minimum courtesy requirements	Able to read some personal and place names, street signs, office and shop designations, numbers and isolated words and phrases
2 - Limited Working Proficiency	Able to satisfy routine social demands and limited work requirements	Able to read simple prose, in a form equivalent to typescript or printing, on subjects within a familiar context
3 - Minimum Professional Proficiency	Able to speak the language with sufficient structural accuracy and vocabulary to participate effectively in most formal and informal conversations on practical, social, and professional topics	Able to read standard newspaper items addressed to the general reader, routine correspondence, reports, and technical materials in the individual's special field.
4 - Full Professional Proficiency	Able to use the language fluently and accurately on all levels pertinent to professional needs.	Able to read all styles and forms of the language pertinent to professional needs.
5 - Native or Bilingual Proficiency	Equivalent to that of an educated native speaker.	Equivalent to that of an educated native.

**RESILIENCE EXPERIMENT HELD AT NEW YORK UNIVERSITY, DECEMBER 9TH, 2016**

Information extrapolated from raw data. 120 female participants - 8 groups of 15 participants each.

		PRE-Test Average Heart Rates		DURING Test Average Heart Rates		Difference in Average Heart Rates		
		How the Inventory items were imagined by the participants		How the Inventory items were imagined by the participants		How the Inventory items were imagined by the participants		
		Participants Imagined Living Through of Events	Participants Underwent "ALERTS" Resilience Training	Participants Imagined Living Through of Events	Participants Underwent "ALERTS" Resilience Training	Participants Imagined Living Through of Events	Participants Underwent "ALERTS" Resilience Training	
N u m b e r o f  L a n g u a g e s s p o k e n	1 language	76	74	105	85	+29	+11	
		(group A1)	(group A2)	(group A1)	(group A2)	(group A1)	(group A2)	
	2 languages	75	76	95	83	+20	+7	
		(group B1)	(group B2)	(group B1)	(group B2)	(group B1)	(group B2)	
	3 languages	75	75	90	80	+15	+5	
		(group C1)	(group C2)	(group C1)	(group C2)	(group C1)	(group C2)	
	4 languages	76	77	85	79	+9	+2	
		(group D1)	(group D2)	(group D1)	(group D2)	(group D1)	(group D2)	
			302	302	375	327	+73	+25
			bpm	bpm	bpm	bpm	bpm	bpm



**RESILIENCE EXPERIMENT RESULTS PLOT CHART,**  
NUMBERS REPRESENT CHANGES IN AVERAGE HEART BEATS PER MINUTE

*X axis: number of languages spoken fluently. Y axis: increase in average number of heart beats per minute.*

