# Prospectus Extraction Template

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| **Introduction**  This section briefly overviews the research focus or problem, why the study is worth conducting, and how the study will be completed.  **The recommended total length for this section is one paragraph.** | |
| * Identify the dissertation topic. | The topic of the dissertation was in regards to operant conditioning brainwave as a biofeedback technique, which can also be referred as electroencephalographic biofeedback (EEG) and neurofeedback (NF). |
| * State whether the study is quantitative or qualitative. | The dissertation was a quantitative study |
| * Describe how the study extends prior research or fills a “need” or “defined gap” from current literature. | The way that this study extends prior research is that the author pointed out that there is a gap that “manifest as a dearth of 19ZNF efficacy studies” (Wigton, 2014). Wigton (2014) is expanding the research that has been carried out on the topic, because there has not been much research done on the topic that is in question. |

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| **Background of the Problem**  The background section explains both the history and the present state of the problem and research focus.  **The recommended total length for this section is two to three paragraphs.** | |
| * Identify the “need,” or “defined gap” for the research study. | The gap that has been identified is that “aims to fill this significant gap manifest as a dearth of 19ZNF efficacy studies” (Wigton, 2014).  Wigton (2014) addressed efficacy of 19ZNF in a clinical setting by using clinical assessments and QEEG z-scores in order to establish efficacy. |
| * Discuss how the “need” or “defined gap” has evolved historically into the current problem or opportunity to be addressed by the proposed study. | The way that the need has evolved historically is one of the first studies that was conducted about EEG behavior was in 1976 by Lubar and Shouse and they researched behavior changes in children. The NF has also been used to help treat ADHD. In 2004, NF was used in order to target symptoms such as hyperactivity, impulsivity and inattention (Heinrich, Gevensleben, Freisleder, Moll, Rothenberger, 2004). NF is a type of behavior therapy that is used to help people self-regulate (Pigott, De Biase, Bodenhamer-Davis, & Davis, 2013). Pigott, De Biase, Bodenhamer-Davis, & Davis (2013) asserted that NF is behavior therapy and that NF can be useful in treating ADHD. In most of the studies that have been done on the topic none have looked at 19ZNF efficacy. The study in question tries to fill that gap that has been identified. |

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| **Theoretical Foundations**  This section identifies the theory(-ies) or model(s) that provide the foundation for the research. This section should present the theory(-ies) or models(s) and explain how the problem under investigation relates to the theory(-ies) or model(s). The theory(-ies) or models(s) guide the research questions and justify what is being measured (variables) as well as how those variables are related (quantitative) or the phenomena being investigated (qualitative).  **The recommended total length for this section is one paragraph.** | |
| * Identify the theory(-ies), model(s) relevant to the variables (quantitative study) or phenomenon (qualitative study).   *Note: quantitative studies should have a theory for each variable.* | The theory that the research was based upon was the learning theory as applied to NF. The models that the research was based upon was the traditional/amplitude-based models of NF, QNF model of NF, and ZNF model of NF. |
| * Describe how the theories relate to the research problem. | The theory is related to the research problem because **“**NF is a learning process which occurs largely outside of 33 conscious awareness; in essence, an implicit learning process (Collura, 2014)” (Wigton, 2014). “As applied to NF, the change in the EEG, as reflected in brainwave frequencies, patterns, or z-scores, is the behavior which is modified as a result of the combined classical and operant conditioning occurring in the NF session (Collura, 2014)” (Wigton, 2014). In other words, it is related because the theory is helping set the stage for the research problem that has been identified. |

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| **Review of the Literature**  This section provides a broad, balanced overview of the existing literature related to the proposed research topic. It describes the literature in related topic areas and its relevance to the proposed research topic findings. It provides a short one-two sentence description of each theme/topic, and it identifies the relevance of the literature to the research topic supporting it with at least one citation from the literature.  **The recommended total length for this section is one to two paragraphs.** | |
| * List the major themes or topics related to the study. | QNF in the literature  4ZNF in the literature  19ZNF in the literature  Outcome measures for ZNF research |
| * Provide a short description of each theme/topic. | QNF models is applicable because it “laid the ground-work for the ZNF models 40 that followed” (Wigton, 2014).  4ZNF is basically the “forerunner to 19ZNF, this topic is explored to provide historical context on both its development and its coverage in the literature” (Wigton, 2014).  19ZNF in the literature is important to the dissertation because this is what the entire paper is really focused on. This section looks at the available literature that has been complied on this topic in the past, which the author found was lacking and used this to help support the gap (Wigton, 2014).  Outcome measures for ZNF research topic in the literature review is important because it looks at what measures are truly suitable for ZNF research (Wigton, 2014). |
| * Identify the relevance of each theme to the research topic supporting each with at least one citation. | The QNF theme is relevant because “Arns et al. (2012) conducted a well-designed open-label study of 21 ADHD subjects using the QNF model, incorporating pre-post outcome measures and QEEG data” (Wigton, 2014).  The 4ZNF theme was relevant because “Wigton (2008) presented a single case study where 4ZNF was used with an adult to address a diagnostic history of ADHD, Bipolar disorder, and anxiety symptoms. The primary pre-post outcome measure was the IVA. Also included were topographic images of pre and post QEEG assessments” (Wigton, 2014).  The 19Znf theme was relevant because “Wigton (2010a) reported on a series of case reviews that employed the Laplacian montage with 19ZNF. There were 10 cases which included conditions such as anger issues, anxiety, ADHD, and impaired cognition. The findings were that 19ZNF led to clinical improvements and QEEG normalization, in less than 10 sessions, in seven out of the 10 cases” (Wigton, 2014).  The outcome measures was relevant because “the IVA was designed as a diagnostic aid for ADHD, the manual provides usage indications to include assessing self-control and attention problems related to other disorders such as depression, anxiety, head injuries, dementia, and other medical problems (Sanford & Turner, 2009)” (Wigton, 2014). |

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| **Problem Statement**  This section includes the problem statement, the population affected, and how the study will contribute to solving the problem.  **The recommended total length for this section is one paragraph.** | |
| * Copy and paste the problem statement from the dissertation. | “It is not known, by way of statistical evaluation of either clinical assessments or QEEG z-scores, if 19ZNF is an effective NF technique” (Wigton, 2014, p. 4). |
| * After reading this section, describe the magnitude and importance of the problem, supporting it with citations from the dissertation. | It was pointed out that 19ZNF is currently a new model but it lacks research being carried out to determine efficacy, this means that scientific efficacy is needed to justify 19ZNF as a method of treatment (Wigton, 2014).  Wigton (2014) pointed out the importance of the problem by noting that “if NF efficacy is defined in terms of large effect sizes when comparing pre-post outcome measure data (Arns et al., 2012), then the effect sizes of this study support 19ZNF as being effective” (p. 113). |

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| **Research Question(s) and/or Hypotheses**  This section narrows the focus of the study and specifies the research questions to address the problem statement. Based on the research questions, it describes the variables or groups and their hypothesized relationship (for a quantitative study) or the phenomena under investigation (for a qualitative study).  **The recommended total length for this section is two to three paragraphs.** | |
| * Copy and paste the research questions and from the dissertation. | R1a. Does 19ZNF improve attention as measured by the Integrated Visual and Auditory continuous performance test (IVA; BrainTrain, Incorporated, Chesterfield, VA)?  R1b. Does 19ZNF improve behavior as measured by the Devereux Scale of Mental Disorders (DSMD; Pearson Education, Incorporated, San Antonio, TX)?  R1c. Does 19ZNF improve executive function as measured by the Behavior Rating Inventory of Executive Functioning (BRIEF; Western Psychological Services, Incorporated, Torrance, CA)?  R2. Does 19ZNF improve electrocortical function as measured by QEEG z-scores (using the Neuroguide Deluxe software, Applied Neuroscience Incorporated, St. 8 Petersburg, FL), such that the post z-scores are closer to the mean than pre zscores? |
| * For a qualitative study, describe the phenomenon to be studied.  For a quantitative study, identify the hypotheses and variables. | Ha1a: The post scores will be higher than the pre scores for the IVA assessment. H01a: The post scores will be lower than, or not significantly different from, the pre scores of the IVA assessment.  Ha1b: The post scores will be lower than the pre scores for the DSMD assessment. H01b: The post scores will be higher than, or not significantly different from, the pre scores of the DSMD assessment.  Ha1c: The post scores will be lower than the pre scores for the BRIEF assessment. H01c: The post scores will be higher than, or not significantly different from, the pre scores of the BRIEF assessment.  Ha2: The post z-scores will be closer to the mean than the pre z-scores. H02: The post z-scores will be farther from the mean, or not significantly different from, the pre z-scores |

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| **Significance of the Study**  This section identifies and describes the significance of the study and the implications of the potential results based on the research questions and the problem statement, hypotheses, or investigated phenomena. It describes how the research fits within and will contribute to the current literature or body of research. It describes potential practical applications from the research.  **The recommended total length for this section is one paragraph.** | |
| * Describe how the proposed research will contribute to the literature, relating it specifically to other studies from the Background of the Problem and Problem Statement, above. | Before this research was carried out the only available 19ZNF research studies carried out were done in a qualitative manner (Hallman, 2012; Koberda et al., 2012a). This study will contribute to the literature because it is expanding on the research and allowing more data to be collected in regards to 19ZNF and it will be quantitative. |
| * Describe how the proposed research will contribute to the literature on the selected theory(-ies) or model(s) that comprise the Theoretical Foundation for the study. | The theoretical framework that guides this is learning theory. It will contribute to the literature in this regard because it will expand on how people in NF are going through the learning theory. The learning theory entails “the reward signal is typically in the form of an auditory tone (beep, chime, music) in combination with an animated visual display (simple game-like displays or movies), which when aesthetically pleasant to the trainee enhances and promotes the process. Some have noted the importance of additional learning theory components such as shaping (Collura, 2014; Sherlin et al., 2011; M. Thompson & Thompson, 2003), anticipation of future rewards (Thatcher, 2013), and secondary reinforcers (Sherlin et al., 2011; M. Thompson & Thompson, 2003) to further inform NF to varying degrees. These variations as applied to NF have served to generate a range of NF models over the years; however the basic foundations of classical/operant conditioning remain constant in all the models” (Wigton, 2014, p. 33). |
| * Describe how addressing the problem will have practical value for the real world considering the population, community, and/or society. | The reason why addressing this problem has practical value is that the data that is gathered was from the “real-world clinical setting, the findings of this study can still contribute to advancing the scientific knowledge of 19ZNF” (Wigton, 2014). Any time that scientific knowledge can be expanded it means that it does indeed have practical value because more can be learned about the topic at hand. |

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| **Rationale for Methodology**  This section clearly justifies the methodology the researcher plans to use for conducting the study. It argues how the methodological framework is the best approach to answer the research questions and address the problem statement. It uses citations from textbooks and articles on research methodology and/or articles on related studies.  **The recommend total length for this section is one paragraph.** | |
| * Identify the methodology for the study (quantitative, qualitative, or mixed). | Quantitative |
| * Justify the research methodology to be used for the study by discussing why it is the best approach for answering the research questions and addressing the problem statement. | The reason why this methodology is appropriate is because the author wanted to carry out a study that was quantitative in nature. The research questions are all written in a manner that means qualitative could not be used to answer them. As a result the quantitative method is the best method possible. |

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| **Nature of the Research Design for the Study**  This section describes the specific research design to answer the research questions and why this approach was selected. It describes the research sample being studied as well as the process that will be used to collect the data on the sample.  **The recommend total length for this section is one paragraph.** | |
| * Identify the specific type of research design chosen for the study. | Quasi-experimental |
| * Identify the sample for the study | 21 |
| * Discuss why the selected design is appropriate to address the research questions. | “When the goal of research is to measure a modification of a behavior pattern, or internal process that is stable and likely unchangeable on its own, the one-group pretest- 12 posttest design is appropriate (Kerlinger, 1986). In this type of design the dependent variable pretest measures are compared to the posttest values for each subject, thus comparing the members of the group to themselves rather than to a control or comparison group (Kerlinger, 1986)” (Wigton, 2014). |

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| **Purpose of the Study**  The purpose statement section provides a reflection of the problem statement and identifies how the study will be accomplished. It explains how the proposed study will contribute to the field.  **The recommend total length for this section is one paragraph.** | |
| * Copy and paste the purpose statement from the dissertation. | “The purpose of this quantitative, retrospective, one-group, pretest-posttest study research was to compare the difference between pre and post clinical assessments and QEEG z-scores data, before and after 19ZNF sessions, from archived data of a private neurofeedback practice in the Southwest region of the United States” (Wigton, 2014, p. 5). |
| * Identify the target population, phenomena (qualitative), and variables (quantitative). | Wigton (2014) noted that the target population as adults and children with clinical symptoms of executive function deficits, poor attention span and behavior.  The independent variable in this study was identified as the 19ZNF.  The dependent variables were defined as the standard scaled scores of three clinical assessments and QEEG z-score data. |

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| **Instrumentation or Sources of Data**  Describes, in detail, all data collection instruments and sources (tests, questionnaires, interviews, data bases, media, etc.). Discusses the specific instrument or source to collect data for each variable or group (quantitative study). Discusses specific instrument or source to collect information to describe the phenomena being studied (qualitative study).  **The recommend total length for this section is one paragraph.** | |
| * Identify the types of data that will be collected to answer each research question (qualitative study) or the data that will be collected for each variable/group (quantitative study). | “The type of archived data used was from the following instruments: One computerized performance test (IVA), two rating scales (DSMD and BRIEF), and QEEG z-scores (Neuroguide software)” (Wigton, 2014). |

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| **Data Collection Procedures**  This section details the entirety of the process used to collect the data. It describes each step of the data collection process in a way that another researcher could replicate the study.  **The recommended total length for this section is two paragraphs.** | |
| * Define the target population and the expected sample size, which comprises the people or organizations being studied, as defined in the problem statement. | In the study at hand the population that was target was adults and children interested in NF as an intervention for improvement of symptoms related to deficits in behavior, attention, and executive function. The total sample size of this study was 21 people. It was pointed out that the sample would actually rely on cases with pre and post QEEG and either IVA, DSMD or BRIEF which was a total of 21 participants (Wigton, 2014). |
| * Include the steps the researcher used to collect data. (e.g., obtaining initial informed consent from participating organization; IRB review; sample selection; groupings; protecting rights/well-being; maintaining data security; sample recruitment; data collection instruments and approaches; field testing instruments; notifying participants; collecting the data, etc.) | The sample of 21 that was used was a convenience sample from closed cases from a NF practice that were given the assessment and Qeegs before and after the treatment started. The researcher also used archival data and the people included in that data were informed that after their treatment was completed and their case closed, non-identifying data could be used for quality assurance or future research purposes; and at that time given the choice to opt-out (Wigton, 2014). |

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| **Data Analysis Procedures**  This section describes how the data were collected for each variable or group (quantitative study) or for each research question (qualitative study). It describes the type of data to be analyzed, identifying the descriptive, inferential, and/or non-statistical analyses. Demonstrates that the research analysis is aligned to the specific research design.  **The recommend total length for this section is one paragraph** | |
| * Describe the analysis to examine each stated research question and/or hypothesis. * *For quantitative studies*, describe the analyses including the inferential and/or descriptive statistics to be completed.   F*or qualitative studies*, describe the specific analytic approach appropriate for the Research Design and each research question to be completed | The Scaled scores were collected from clinical assessments and QEEG z-scores were collected from archival documents. After it was collected it was then organized into spreadsheets for analysis with SPSS v21 software. “For all hypotheses, the plan was for paired t tests on the pre/post difference scores, for the means of the selected scales and z-scores, for each outcome measure. The data from the spreadsheet columns, for the pre and post values (for the scales of each outcome measure) was transferred into SPSS. Next, the SPSS command sequence selected was Analysis>Compare Means>Paired Samples T Test. The pre values were identified as Variable1 and the post values identified as Variable2, and the Confidence Interval Percentage will be set at 95%. Finally, Hedge’s d effect sizes were calculated with the Metawin 2.1 software” (Wigton, 2014). |

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| **Ethical Considerations**  This section discusses the potential ethical issues surrounding the research as well as how human subjects and data will be protected. It identifies how any potential ethical issues will be addressed.  **The recommended total length for this section is one paragraph.** | |
| * Describe how the identities of the participants in the study and data will be protected. | Wigton (2014) pointed out that there is no ethical problems associated with this study because the study was exempt from the requirements of the Protection of Human Subjects 45 CFR part 46 (2009) regulation. As a result of this exemption, IRB-approved consent was not needed.  As a result of archival data being used for this study the data was collected in a manner that would not identify identities of people involved. |
| * Describe subject recruiting, informed consent, and site authorization processes. | There was no recruiting, informed consent or site authorization processes involved with this study. The reason is because archival data was used. When archival data is used it means that the patients completed treatment and at that point would have been informed that data may be used in a future study and were given the option to opt-out of the study (Wigton, 2014). |

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| **References**  Include an APA-formatted reference for each citation presented above. |
| Arns, M., Drinkenburg, W., & Kenemans, J. L. (2012). The effects of QEEG-informed neurofeedback in ADHD: An open-label pilot study. *Applied Psychophysiology and Biofeedback*, *37*, 171-180. doi:10.1007/s10484-012-9191-4  Collura, T. F. (2014). *Technical foundations of neurofeedback*. New York, NY:  Routledge.  Hallman, D. W. (2012). 19-Channel neurofeedback in an adolescent with FASD. *Journal of Neurotherapy, 16*(2), 150-154. doi:10.1080/10874208.2012.677646  Heinrich, H., Gevensleben, H., Freisleder, F. J., Moll, G. H., & Rothenberger, A. (2004). Training of slow cortical potentials in attention-deficift hyperactivity disorder: Evidence for positive behavioral and neurophysiological effects. *Biological Psychiatry. 55*(7), 772-775.  Kerlinger, F. N. (1986). *Foundations of behavioral research* (3rd ed.). Orlando, FL: Holt, Reinhardt, & Winston.  Koberda, J. L., Moses, A., Koberda, P., & Koberda, L. (2012a, September). *Comparison of the effectiveness of z-score surface/LORETA 19-electrodes neurofeedback to standard 1-electrode neurofeedback.* Oral Presentation at the 20th AnnualConference of the International Society for Neurofeedback and Research,  Orlando, FL.  Pigott, H. E., De Biase, L., Bodenhamer-Davis, E., & Davis, R. E. (2013). The evidence base for neurofeedback as a reimbursable healthcare service to treat attention deficit/hyperactivity disorder. Retrieved from International Society for  Sanford, J. A., & Turner, A. (2009). *Integrated Visual and Auditory Continuous Performance Test Administration manual*. North Chesterfield, VA: BrainTrain  Inc.  Sherlin, L. H., Arns, M., Lubar, J., Heinrich, H., Kerson, C., Strehl, U., & Sterman, M. B. (2011). Neurofeedback and basic learning theory: Implications for research and practice, *Journal of Neurotherapy, 15*(4), 292-304. doi: 10.1080/10874208.2011.623089  Thatcher, R. W. (2013). Latest developments in live z-score training: Symptom check list, phase reset, and LORETA z-score biofeedback. *Journal of Neurotherapy, 17*(1), 69-87. doi:10.1080/10874208.2013.759032  Thompson, M., & Thompson, L. (2003). *The neurofeedback book*. Wheat Ridge, CO:  Association of Applied Psychophysiology and Biofeedback.  Wigton, N. L. (2010a, September). *Laplacian z-score neurofeedback: A unique option in the realm of multi-channel z-score neurofeedback*. Plenary Session OralPresentation at the 18th Annual Conference of the International Society for  Neurofeedback and Research, Denver, CO.  Wigton, N. L. (2014). Evaluating 19-channel Z-score neurofeedback: Addressing efficacy in a clinical setting (Doctoral dissertation). Retrieved from Dissertations & Theses @ Grand Canyon University. (Order No. 3625170) |