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### General Info

FileNo: 106385

Title: Behavioral studies of rhythm and music perception

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Keywords:

### Project Members

##### Principal Investigator

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Comments:

##### Others

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Rank** | **Last Name** | **First Name** | **Affiliation** | **Role In Project** |
| PhD Student | Cameron | Daniel | Social Science\Psychology | Co-Investigator |
| PhD Student | Nguyen | Tram | Social Science\Psychology | Co-Investigator |
| Masters Student | Sternin | Avital | Social Science\Psychology | Co-Investigator |
| Postdoctoral Fellow | Henry | Molly | Social Science\Psychology | Co-Investigator |
| Postdoctoral Fellow | McGarry | Lucy | Social Science\Psychology | Co-Investigator |
| PhD Student | Gibbings | Aaron | Social Science\Psychology | Co-Investigator |
| Masters Student | Roberts | Brittany | Schulich School of Medicine and Dentistry\Neuroscience | Research Support Staff |
| Masters Student | Watson | Sarah | Social Science\Psychology | Research Support Staff |
| PhD Student | Ready | Emily | Health Sciences\Health & Rehabilitation Sciences | Research Support Staff |
| Undergraduate Student | Wasfi | Gamila | Health Sciences\Kinesiology | Student |
| Undergraduate Student | Rusu | Ruxanda | Social Science\Psychology | Student |
| Undergraduate Student | Bell | Alison | Science\Science | Student |
| Undergraduate Student | Rinchon | Cricia | Social Science\Psychology | Student |
| Undergraduate Student | Lachance | Esther | Social Science\Psychology | Student |
| Undergraduate Student | White | Morgen | Social Science\Psychology | Student |
| Undergraduate Student | Mahmood | Daniyal | Social Science\Psychology | Student |
| Undergraduate Student | Prete | David | Social Science\Psychology | Student |

### Common Questions

##### 1. Registration Information

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| **#** | **Question** | **Answer** |
| 1.1 | Do you confirm that you have read the above information and that based on that information you are completing the correct form? | Yes |
| 1.2 | Are you requesting delegated review? (Please see the blue "i" for a definition of minimal risk. Please note requesting delegated review is not a guarantee as it is determined on a case by case basis) | Yes |
| 1.3 | If you answered yes to question 1.2 please justify why you believe your study qualifies for delegated review. | The studies completed as part of this project are all behavioral. Participants will be asked to listen to sounds (always presented at a comfortable listening level) or to watch visual stimuli presented on a computer screen and make simple responses by pressing a button on a response box, clicking a computer mouse, pressing a key on a computer keyboard, writing a response with pen/paper, or walking on a specialized mat to measure footsteps. The probability and magnitude of possible harms brought on by participation in the research is no greater than those encountered by the participants in everyday life. |
| 1.4 | Please indicate the faculty you are affiliated with. | Social Science |
| 1.5 | Has this study been submitted to any other research ethics board (REB)? If yes, please include the approval letter (or relevant correspondence) as an attachment in the attachments tab. | No |
| 1.6 | If YES is selected in question 1.5 above, please indicate where this project has been submitted and when. |  |
| 1.7 | Is this a sequel to previously approved research? | No |
| 1.8 | If YES is selected in question 1.7 above, what is the REB number and what are the differences? |  |
| 1.9 | Indicate the funding source for this study or if there is no funding simply indicate "NONE". | UWO Start-up funds and NSERC Discovery grant awarded to Dr. Jessica Grahn R4836A03 |
| 1.10 | Is this a student project? | No |
| 1.11 | If YES Other was selected in 1.10, please indicate what you mean by this. |  |
| 1.12 | Please list the names of ALL Local (Western affiliated) team members who are working on this project and their roles and responsibilities. Please see the “i” for this question for instructions on how to link their Romeo accounts to this form so they have access to it. | Dr. Jessica Grahn: Oversee project, experimental design, data analysis, write up research findings Daniel Cameron / Dirk Schuit / Tram Nguyen / Aaron Gibbings / Avital Sternin / Dr. Molly Henry / Dr. Lucy McGarry: Experimental design, data collection, data analysis, write up research findings Morgen White / Daniyal Mahmood / David Prete / Esther Lachance / Alison Bell / Victor Wu / Alexis Harrison / Kathleen Irwin / Saad Ahmed / Cricia Rinchon / Roxy Rusu / Himanshu Gupta / Helen Liu / Umar Azhar / Gamila Wasfi: Experimental design, participant recruitment, data collection, data analysis, write up research findings |
| 1.13 | Lay summary of the study (approximately five lines). | Music is an important part of human experience that can affect, memory, mood, and our movement. In turn, moving with a rhythm can change the way we hear or see it relative to when we do not move. This reciprocal relationship between music and movement is particularly apparent when a rhythm gives rise to a sense of "beat". The behavioral studies comprising the proposed project will test 1) how humans perceive auditory/visual rhythms, 2) how the presence of rhythm (with or without a beat) affects our perception of and memory for auditory/visual stimuli, 3) how moving along with a rhythm changes our perception, 4) how music-induced moods change our perception and thinking, and 5) how individuals vary with respect to the first four points. |
| 1.14 | Briefly provide any plans for feedback of results to participants. | Once they have completed the study, participants will be provided with a debriefing form, along with contact information. If the participants wish to ask questions or have the published work sent to them, they may contact the PIs. |
| 1.15 | If this form was started by a team member, has the role of Principal Investigator been changed to the Faculty member who will hold this role for the study? This is required for review of your submission, and any forms submitted without this change being made will be returned without being reviewed. (The blue information “i” has the instructions on how to change the role of PI.) | Not Applicable - form started by the PI |

##### 2. Methodology

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| **#** | **Question** | **Answer** |
| 2.1 | Outline the study rationale, including relevant background information and justification. Cite references where appropriate. | Perception of temporal patterns is fundamental to normal hearing, speech, motor control, and music. Sensitivities to certain patterns are unique to humans (Fitch, 2006; McDermott & Hauser, 2007), such as our sensitivity to musical rhythm, in which we rapidly identify the central structural component called the ‘beat’ (Parncutt, 1994). The beat is the regular time interval that we tap to, and against which other time intervals in the rhythm are measured. Tapping to the beat in music is a near-universal behavior in humans, but is not seen in other primates (Drake, 1998). Despite this universality, rhythm/timing abilities and the ability to feel a beat in a musical rhythm depend both on physical characteristics of the rhythm like modality (auditory, visual; Grahn, Henry, & McAuley, 2011; Grahn, 2012) and event timing (Grahn & Brett, 2007) as well as on individual differences such as musical expertise/training and exposure (Cameron & Grahn, 2014; Grahn & Rowe, 2009), auditory short-term memory (Grahn & Schuit, 2012), and activation (as measured by fMRI) in specific brain areas thought to underlie beat perception (Grahn & McAuley, 2009). Differences in timing/rhythm abilities translate to differences in the ability to perceive, synchronize with, remember, or reproduce rhythmic stimuli (Grahn & Brett, 2007, 2009; Leow et al., 2014) or potentially even to the ability to understand spoken and written language (Gordon et al., 2014; Muneaux et al., 2004). Moreover, physical and subjective characteristics of music can affect specific cognitive functions like working memory and attention (Wallace, 1994). The current project will characterize the physical stimulus characteristics (e.g., modality, tempo, event timing), subjective stimulus characteristics (e.g., preferences, familiarity, valence), and individual participant differences (such as musical training, memory capacity, perceptual thresholds) that contribute to differences in timing and rhythm abilities (for example, differential ability to pick up on a beat in musical rhythm), movement along with music (as measured e.g., by finger tapping, motion capture, or walking on a specialized gait pad that measures footsteps) and cognitive performance (for example, performance on working memory or attention tasks). Moreover, the experiments conducted as part of this project will assess the consequences of differences in timing/rhythm abilities for perception of auditory and visual stimuli, synchronization with rhythms, and memory for rhythms/music or other material. The results will contribute to the burgeoning scientific field of music and rhythm perception, and will moreover make critical progress towards understanding disorders like Parkinson’s disease in which abilities to perceive and produce rhythms are compromised (Grahn & Brett, 2009). |
| 2.2 | Please provide a clear statement of the purpose and objectives of this project. | The purpose of this large-scale project is to understand the reciprocal interactions between music, timing and rhythm abilities, movement, and perception/cognition. As such, the specific objectives are as follows: 1) to examine how physical characteristics of music/rhythm influence perception, cognition, and movement, 2) to examine how subjective impressions of music/rhythm stimuli contribute to cognitive performance and movement, and 3) to assess the contributions of individual-difference factors such as musical training, working memory capacity, and timing/rhythm abilities to perception of and movement along with music/rhythm. |
| 2.3 | Describe the study design/methodology and attach all supporting documents in the attachment tab. | A total of 750 individuals will be recruited for this study. Recruitment methods will be: word of mouth, recruitment via posters in buildings, online, and through social media (using the information approved for the posters), invitations through the psychology participant pool, invitations delivered to classes (but only classes not taught by those involved in this project), and distribution of mini versions of the attached posters as flyers to individuals who will willingly take them. All individuals will be scheduled to come to the testing rooms in the Brain and Mind Institute, Social Sciences Centre, or Robarts Research Institute for participation. After the study is explained, questions answered, and informed consent obtained, the individual will complete the experiment. Auditory stimuli will vary in complexity (ranging from simple tone sequences to real music and speech) and, in the case of real music, aspects such as genre and familiarity. Auditory stimuli will be presented over headphones or loudspeakers, and always at a comfortable sound level. Visual stimuli will vary in complexity (ranging from simple sequences of flashes to movies of e.g., balls bouncing or fingers moving) and biological relevance (movies could be of moving animate or inanimate objects). Visual stimuli will be presented on a computer screen, and will be neutral with respect to valence. Instructions for all tasks will be presented visually on a computer screen and/or recorded auditory instructions may be presented over headphones/loudspeakers. Participants will be tested on one of several dimensions of the stimuli, depending on the specific task and optimized based on pilot testing: 1) perception (i.e., detection or discrimination of a target stimulus or discrimination between rhythms), 2) (re)production/synchronization (by tapping with the finger or foot while movement is recorded with motion capture or walking on a specialized gait mat), 3) subjective impressions (as indexed by ratings) of, for example, musical familiarity, enjoyment/preference, arousal, mood, etc., or 4) performance on a cognitive task (involving e.g., working memory or attention) during or after the presentation of musical stimuli. For perception (detection/discrimination) tasks, participants will be asked to indicate whether they detected the presence of a stimulus or a difference between two stimuli by pressing a button on a response box or keyboard, clicking with a mouse, or making a paper/pencil response. For (re)production/synchronization tasks, participants will be asked to tap on a keyboard, response box, or specialized tapping device, or to walk on a mat that detects footsteps (walking speed, stride length). Movement may also be recorded with a motion capture system. Finally, for rating tasks, participants will indicate ratings using a computer keyboard, clicking on a scale with a mouse, or making a paper/pencil response. For the purposes of assessing individual differences in beat perception abilities (either before or after participation in a laboratory experiment), participants may be asked to complete a short, online, computer-based experiment in which they detect misalignments between the beat in snippets of real music and a beat superimposed on the music (referred to as a “beat alignment test”; Iverson & Patel, 2010). Participants will also be asked about demographic information that is relevant to our work, such as age, music and dance training, hearing status, handedness, and language experience. These can have an influence on our measurements so it is important that we collect this information. Some participants may also undergo a brief audiometric assessment, in which a pure-tone behavioral audiogram is completed to assess the individual’s thresholds for detecting pure tones. Tones are presented one at a time through ear phones and the participant will signal when each tone is detected. The tones become progressively quieter until the individual is no longer able to hear them. This assessment normally takes about 12 minutes to complete. If any individuals are identified as potentially having a hearing impairment, they will be encouraged in an appropriately compassionate manner to seek professional assessment from their family practitioner or an audiologist. |
| 2.4 | If your submission deals with groups such as aboriginal peoples, or isolated communities, or work in other countries or cultures please indicate "YES" here and complete the Cultural Research tab of form. | No |
| 2.5 | Indicate the inclusion criteria for participant recruitment. | Adults aged 17 (undergraduates treated as emancipated minors) and older. At times, individuals will be recruited for their particular expertise or background (e.g., 10+ years of music training, training on a specific instrument or style of dance, age category). Each participant will have normal or corrected-to-normal vision and normal hearing. Confirmation of normal hearing abilities will be provided by the participant (self-report) or in some cases may be acquired through standard audiological screening (at the Brain and Mind Institute). |
| 2.6 | Considering your inclusion criteria listed above, what is the basis to exclude a potential participant? | Individuals younger than 17 and participants lacking adequate visual or hearing abilities to complete the task will be excluded from the study. |
| 2.7 | How many participants over the age of 18 from London will be enrolled in your study? This includes hospital and university sites within London. | 1500 |
| 2.8 | How many participants under the age of 18 from London will be enrolled in your study? This includes hospital and university sites within London. | 40 |
| 2.9 | How many participants over the age of 18 will be included at all study locations? (London + Other locations = Total) | 1500 |
| 2.10 | How many participants under the age of 18 will be included at all study locations? (London + Other locations = Total) | 40 |
| 2.11 | Does this study include any use of deliberate deception or withholding of key information that may influence a participant's performance or response? | No |
| 2.12 | If YES is selected in question 2.11 above, provide an explanation, including how participants will be debriefed and attach the debriefing script you will use in the attachments tab. |  |

##### 3. Risks and Benefits

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| **#** | **Question** | **Answer** |
| 3.1 | List any potential benefits to the participants. | There are no direct benefits of participation in this study. Participants will however be contributing to research that will provide broader society benefits (see next response). Moreover, participants are often interested in the topic of the study and would like to learn more. |
| 3.2 | List any potential benefits to society. | This line of research has the potential to lead to advancements in medical care (e.g., music or motor therapy) for disorders like Parkinson’s disease, and will contribute more broadly to our scientific understanding of music perception. |
| 3.3 | List any potential risks to study participants. | There are no potential risks to the participants in this study beyond those encountered in everyday life. |
| 3.4 | List any potential inconveniences to daily activities. | Participants may be minimally inconvenienced, in that they will need to come to the study location for participation. Participants will therefore be compensated for the time committed to the study and the inconveniences associated with participation in the study. There are no other known inconveniences. |

##### 4. Recruitment and Informed Consent

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| **#** | **Question** | **Answer** |
| 4.1 | How will potential participants be contacted? Select all that apply. A copy of all recruitment tools that will be used must be included with this submission in the attachments tab. | In person|Email (publicly available addresses)|Email (mass email list)|Telephone |
| 4.2 | If other is selected in 4.1, please explain here. |  |
| 4.3 | Please explain in detail how the above method(s) from 4.1 will be used to recruit participants. | We will display approved posters on campus and on the internet to invite participants. We will give miniature versions of our posters (i.e., flyers) to individuals who willingly accept them. We will use existing student email lists (e.g., maintained by the Western University, the Psychology Department, and Brain and Mind Institute) to invite participants using the language of the approved posters, or if the individual departments prefer, provide miniature posters for student mailboxes. These invitations include contact information for a project team member so that individuals can choose whether they would like to contact us. We also plan to advertise the study on social media sites (e.g., Facebook, Kijiji, Twitter) using the same language as the approved poster. We will also use newspaper advertisements with the information of the approved poster. We will invite students by speaking briefly to classes where the instructor has agreed that it would be acceptable to do so (and when a project team member does not teach the students). We will contact individuals who are part of the Department of Psychology’s participant pool (SONA). We will also make use of word-of-mouth. This approach is expected to be particularly helpful within musicians’ circles for recruiting for musically trained individuals. In all cases, it will be left up to each individual to decide whether to contact us and participate in the study. Finally, team members will contact those participants who participated in previous studies (including the online test described in section 2.3) who expressed an interest and willingness to participate in future studies, and we will invite them to participate in this new study using the language of the approved posters. |
| 4.4 | Which research team members will be recruiting the potential participants? | Morgen White / Daniyal Mahmood / David Prete / Esther Lachance / Alison Bell / Victor Wu / Alexis Harrison / Kathleen Irwin / Saad Ahmed / Cricia Rinchon / Roxy Rusu / Himanshu Gupta / Helen Liu / Umar Azhar / Gamila Wasfi |
| 4.5 | Does the Principal Investigator have any relationship with the potential participants? | No |
| 4.6 | Does the person recruiting the participants have any relationship or hold any authority over the potential participants? | No |
| 4.7 | If you have answered "YES" to either 4.4 or 4.5, please explain here. |  |
| 4.8 | Indicate if you will be recruiting from any of the following groups specifically for this study (Select all that apply). | Students|Any Western University Research pool|Western University Staff |
| 4.9 | Indicate any anticipated communication difficulties (Select all that apply). | None |
| 4.10 | If Other was selected in 4.8, please indicate what you mean by this. |  |
| 4.11 | If you have selected one of the anticipated communication difficulties above in question 4.8, please describe what procedures will be used to address this issue (e.g., the use of translated forms, translator, impartial witness, etc.). |  |
| 4.12 | What method of obtaining consent will you use for participants? A copy of all forms being used for obtaining consent must be included with this submission please add to the attachments tab. Please note that templates for many of these documents can be found on our website at http://www.uwo.ca/research/services/ethics/nonmedical\_reb/tips.html. Failure to use these templates may result in a delay in approval. | Written consent |
| 4.13 | If you are unable to obtain consent or assent using one of the methods listed above, please explain here. (Note, this does not apply to cultural research, please see the Cultural Research tab). |  |
| 4.14 | Indicate whether participants will be compensated for their participation. For example, reimbursement for expenses incurred as a result of research, description of gifts for participation, draws and/or compensation for time. Include a justification for this compensation. | Participants enrolled in a Psychology course will receive research credits (one credit per hour of participation), and participants not enrolled in a Psychology course (recruited via posters) will receive monetary compensation ($5 per half hour of participation). Compensation is for the time committed to the study and the inconveniences associated with participation in the study. |

##### 5. Confidentiality and Data Security

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| **#** | **Question** | **Answer** |
| 5.1 | How will data without personal information be stored and protected? | University network drive |
| 5.2 | If "not stored electronically" was selected in 5.1 please indicate where data will be stored. |  |
| 5.3 | If OFF-SITE is selected above, please explain where and what security measures are being used. |  |
| 5.4 | Western University policy requires that you keep data for a minimum of 5 years. Please indicate if you are keeping data in accordance to this policy, otherwise please comment on how your data retention will differ from University policy and why. If you will be archiving the data, please explain why and how here. | Data will be kept for 5 years in accordance with Western University Policy. |
| 5.5 | How will electronic and paper documents as well as study data be destroyed after this period? (if applicable) | Data identified by code which cannot be traced back to individuals will be kept on a password-protected computer or networked drive until full analyses have been completed and the manuscript has been accepted for publication. Subsequently, archives will be kept in the form of external password protected media in case any group re-analyses are requested or the journals, granting agencies need to verify data integrity, or subsequent reanalysis of data with new techniques or meta analyses are desirable. The key file linking individuals to identifier codes will be kept on a password protected and encrypted drive. This key file will be erased once data collection and analysis are completed. |
| 5.6 | Are you collecting any personal information from participants? | Yes |
| 5.7 | If you checked any of the personal information in 5.6 above, please justify this collection. | Full names and contact information (telephone number and email address) will be collected as part of the consent process and for scheduling purposes. Situations may arise when appointments for data collection must be changed. For this reason, names, email addresses, and phone numbers are required to maintain contact as necessary to schedule and confirm future data collection dates. Moreover, participants sometimes indicate that they would be willing to return for participation in future studies. Contact information for these participants is required to schedule future testing dates. Personal identifiers (name and contact information) will be linked to a unique participant ID in a master file list. All data collected will be associated only with the participant ID. |
| 5.8 | 'If you checked any of the personal information in 5.6, please indicate where these identifiers will be collected. Please note that no identifiers can be collected or stored with the data. Identifiers should be stored on a master list separate from the data and linked only with a unique ID' | Identifying information will be collected at the time that the participant first contacts a project team member so that it can be used to communicate and schedule with the participant. Names and contact information for participants will be stored in a secure, password-protected file accessible only by project team members responsible for participant recruitment. Names and contact information will also be collected as part of the consent process. Consent forms will be stored in a secure, locked file cabinet. Each participant will be assigned a unique participant ID that will be associated with their data so that their data will remain anonymous. All collected data will be associated with the participant ID. A master list linking the identifying information to the unique participant ID will be kept in a separate file location from all data in a secure, password-protected file accessible only by involved project team members. |
| 5.9 | If YES is selected in question 5.6 above, which personal information is being collected? (select all that apply) | Full name|Telephone number|Email |
| 5.10 | Please list any agencies/groups/persons outside of your local research team who may have access to any participant's personal information and indicate why such access is required. | No one but the research team will have access to the information. |
| 5.11 | Describe any coding system used to protect personal information or explain why the data must remain identifiable. | Participant data will be coded with a unique participant ID that will not be linked to any document or form with identifying personal information. Unique participant IDs will only be linked to identifying information in a secure, password-protected file accessible only by project team members. |
| 5.12 | How will the master list, signed original consent forms or other data with personal information be stored and protected? | Paper file (Required protection: Locked cabinet in locked institutional office)|Electronic file (local) (Required protection: Password protected computer on a secure network behind institutional firewalls - specify location) |
| 5.13 | If OTHER is selected in question 5.12 above, please describe. |  |
| 5.14 | Does this study require you to send any of the information listed in 5.7 outside of the institution where it is collected? This includes data taken off-site from the site it is initially collected for analysis. If yes, a data transfer agreement may be necessary. | Yes |
| 5.15 | If you answered "YES" to 5.14, provide details as to where and how data will be transmitted. |  |
| 5.16 | How will study data be recorded? | Instruments |
| 5.17 | If you checked Audio Recording in question 5.16 can participants take part in the study if they do not wish to be audio recorded? This information must be included in your Letter of Information. |  |
| 5.18 | If OTHER is selected in question 5.16 above, please describe. |  |

##### 6. Cultural Research

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| **#** | **Question** | **Answer** |
| 6.1 | Indicate which of the following special considerations should be acknowledged when reviewing the ethical standards of your research. |  |
| 6.2 | Address how the work will be dealt with and what approvals have been or will be sought from the community. |  |
| 6.3 | Address how you will obtain consent from the group you are working with, if written consent cannot be obtained. |  |

##### 7. Confirmation of Responsibility

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| **#** | **Question** | **Answer** |
| 7.1 | As the Principal Investigator I have read the Tri-Council Policy Statement 2 and Western University's Guidelines on Non-Medical Research involving Human Subjects and agree to abide by the guidelines therein: http://www.uwo.ca/research/ethics/non-medical/guidelines.html; | Yes |
| 7.2 | I attest that all Collaborators working on this Research Study (co-investigators, students, post- docs, etc.) have reviewed the protocol contents and are in agreement with the protocol as submitted; | Yes |
| 7.3 | All Collaborators have read the Tri-Council Policy Statement 2 and Western University's Guidelines on Non-Medical Research involving Human Subjects and agree to abide by the guidelines therein; | Yes |
| 7.4 | The Collaborators and I will adhere to the Protocol and Letter(s) of Information as approved by the REB; | Yes |
| 7.5 | Should I encounter any changes or adverse events/experiences, I will notify the REB of in a timely manner; and | Yes |
| 7.6 | If the Research Study is funded by an external sponsor, I will not begin the Research Study until the contract/agreement has been approved by the appropriate university, hospital, or research institute official; | Yes |
| 7.7 | Have you exported a copy of this submission to Word using the "Export to Word" button? Note that you will be unable to submit future revisions if this is not done. | Yes |
| 7.8 | Have you uploaded the following documents, if applicable, to the attachments tab? If you are unsure of what documents are needed with your submission please contact our office before submitting to clarify. Incomplete submissions will be returned without being reviewed. | Letter(s) of Information and Consent Documentation|Recruitment Materials |

##### 8. Confirmation of Responsibility - Student

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| **#** | **Question** | **Answer** |
| 8.1 | Is this a student project? | No |
| 8.2 | As the Student I have read the Tri-Council Policy Statement 2 and Western University's Guidelines on Non-Medical Research involving Human Subjects and agree to abide by the guidelines therein: http://www.uwo.ca/research/ethics/non-medical/guidelines.html; |  |
| 8.3 | I will adhere to the Protocol and Letter(s) of Information as approved by the REB; |  |
| 8.4 | I will notify the Principal Investigator as soon as possible if there are any changes or adverse events/experiences, violations/deviations in regards to the Research Study; |  |

### Attachments

|  |  |  |
| --- | --- | --- |
| **Description** | **File Name** | **Version Date** |
| Initial Approval Notice | DOC033115-03312015103929-0011.pdf | 31/03/2015 |
| May 5, 2015 | DOC050815-05082015144438-0012.pdf |  |
| 2016/02/22 - CER | DOC030916-03092016164711-0002.pdf | 09/03/2016 |



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