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Information and Bicycle Stage of Change: Understanding Influences on Travel Behaviour Change toward Cycling in Montreal

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Mémoire présenté en vue de l'obtention du diplôme de *Maîtrise ès sciences appliquées*
Génie civil

Mai 2026

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Ce mémoire intitulé :

Information and Bicycle Stage of Change: Understanding Influences on Travel Behaviour Change toward Cycling in Montreal

présenté par **Alessia VINET**
en vue de l'obtention du diplôme de *Maîtrise ès sciences appliquées*
a été dûment accepté par le jury d'examen constitué de :

Geneviève BOISJOLY, présidente
Owen WAYGOOD, membre et directeur de recherche
Clémentine HAURET, membre

DEDICATION

So yes, cycling can save the world - or at the very least make it a significantly and noticeably more healthy, safe, equitable, and happy place.
- Peter Walker

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I would first like to sincerely thank my supervisors, Owen Waygood, Kevin Manaugh, and Jérôme Laviolette, for giving me the opportunity to work on this project. Although I completed my undergraduate degree in a different branch of engineering, they believed in me and allowed me to pursue work in the field of transportation—where I have truly flourished and had the chance to engage with issues that matter deeply to me. Their unfailing support, guidance, wisdom and patience were essential to the success of this project.

I also want to thank the entire team of the Accepter le vélo project. The different research streams provided valuable insights that helped shape and guide this work. I am also grateful for their participation in the testing phases of this project, particularly during the practice round of the focus groups.

I would also like to express my deepest gratitude to my parents. They taught me the importance of perseverance, encouraged me to find something I truly enjoy in life—whatever it may be—and to never be afraid of trying new things. Their constant love and encouragement have been invaluable throughout this journey.

To my partner, Vincent, thank you for standing by me and continuously supporting me through the more challenging moments of this journey.

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RÉSUMÉ

La crise climatique actuelle nécessite des efforts accrus pour réduire les émissions de gaz à effet de serre. Au Québec, le transport est le principal secteur émetteur, avec le transport routier représentant à lui seul 33,4% des émissions totales. Parallèlement, l'inactivité physique, associée à un mode de vie sédentaire, est désormais un problème de santé publique majeur, constituant un facteur de risque important dans l'apparition de plusieurs troubles de santé, tels que l'obésité et les maladies cardiovasculaires. De plus, l'inactivité croissante impose des coûts importants au système de santé. Pour relever ces deux défis simultanément, le transport actif constitue une solution prometteuse. Bien que le vélo utilitaire présente de nombreux avantages bien documentés, il reste sous-utilisé. L'objectif de ce projet est donc d'examiner le rôle de l'information dans l'accompagnement des changements de comportements de mobilité vers le vélo comme moyen de transport, en utilisant le modèle des étapes de changement de comportement comme cadre théorique.

Le projet comprend deux études. La première est menée auprès d'étudiants de première année à Polytechnique Montréal et consiste à tester trois types d'information diffusée dans le cadre d'une intervention en classe. Les progrès en matière d'attitudes et de comportements vis-à-vis du vélo sont suivis à travers trois séries d'enquêtes : avant l'intervention, un mois après l'intervention et huit mois après l'intervention. La deuxième étude utilise des groupes de discussion avec la population générale du Grand Montréal pour évaluer comment les étapes de changement de comportement influencent les attitudes et les obstacles perçus au vélo. Les participants ont été regroupés en fonction de leur étape de changement envers le vélo et trois groupes distincts ont été constitués : les non-cyclistes, les cyclistes occasionnels et les cyclistes convaincus.

Pour la première étude, parmi les 122 étudiants ayant répondu aux trois enquêtes, l'intervention n'a entraîné aucun changement significatif dans les comportements ou les attitudes vis-à-vis du vélo, aucune différence n'ayant été observée entre le groupe contrôle et le groupe expérimental. Par rapport au groupe contrôle, les étudiants du groupe expérimental n'étaient pas plus enclins à essayer BIXI, à progresser dans les étapes de changement de comportement en matière de vélo, ni à exprimer un soutien plus marqué en faveur du vélo. Cependant, la composition des groupes a pu constituer un facteur de confusion, car les programmes d'ingénierie n'étaient pas répartis de manière uniforme entre les groupes. Par exemple, tous les étudiants en génie civil, une discipline qui aborde des thèmes tels que l'urbanisme, le transport et la durabilité, ont été assignés au groupe contrôle.

Pour la deuxième étude, les groupes de discussion ont révélé que les personnes se trouvant aux étapes inférieures du processus de changement perçoivent davantage d'obstacles à la pratique du vélo que celles se trouvant aux étapes supérieures. Cependant, les personnes aux stades supérieurs ne sont pas exemptes de barrières, car elles ont des conditions spécifiques dans lesquelles elles acceptent de faire du vélo.

Ces résultats indiquent la nécessité de maintenir et d'améliorer les conditions de pratique du vélo afin de retenir les cyclistes actuels et d'en attirer de nouveaux. Pour inciter la population à adopter le vélo comme moyen de transport, il ne suffit pas de fournir de l'information : cela nécessite des infrastructures, des stratégies ciblées et une compréhension de l'état de préparation au changement des individus.

ABSTRACT

The current climate crisis calls for greater efforts than ever to reduce greenhouse gas emissions. In Quebec, transport is the leading emitting sector, with road transport alone accounting for 33.4% of total emissions. Meanwhile, physical inactivity, combined with sedentary behaviour, has become a population-level crisis, serving as a significant risk factor in the development of several health issues, such as obesity and cardiovascular disease. What's more, our increasingly inactive population imposes significant costs on the healthcare system. To address both challenges simultaneously, active transport presents a promising solution. Although cycling for transport has many well documented benefits, it remains underutilised. Therefore, the objective of this project is to examine the role of information in accompanying travel behaviour change toward cycling for transport using the stages of change framework as a theoretical lens.

The project comprises two studies. The first is conducted with first-year university students at Polytechnique Montréal, testing three different information packages delivered through an in-class intervention. Progress related to cycling attitudes and behaviour is tracked across three rounds of surveys: pre-intervention, one month post-intervention, and eight months post-intervention. The second study uses focus groups with the general population of Greater Montreal to assess how stages of change influence attitudes and perceived barriers to cycling. Participants were grouped according to stage of change for cycling and three different groups were hosted: Non-cyclists, Occasional cyclists and Convinced cyclists.

For the first study, among the 122 students who completed all three surveys, the intervention produced no significant changes in cycling behaviour or attitudes, with no difference observed between control and experimental groups. Compared to the control group, students in the experimental group were no more likely to try BIXI, progress along the stages of change for cycling, or express greater support for cycling. However, group composition might have acted as a confounding factor, as engineering programs were not uniformly distributed across groups. For instance, all students in civil engineering, a discipline that engages with topics such as urban planning, transport, and sustainability, were assigned to the control group.

For the second study, the focus groups revealed that individuals in lower stages of change perceive more barriers to cycling than those at higher stages. However, individuals at higher stages are not barrier-free, as they hold specific conditions under which they are willing to cycle.

These findings indicate the need to both maintain and improve cycling conditions in order to

keep current cyclists engaged in this behaviour and attract new ones. Shifting populations toward cycling for transport will require more than information: it demands infrastructure, targeted strategies, and an understanding of where individuals stand in their readiness to change.

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LIST OF SYMBOLS AND ACRONYMS

GHG	Greenhouse Gas
MAP	Model of Action Phases
NAM	Norm-Activation Model
SOC	Stages of Change
SSBC	Stage Model of Self-Regulated Behavioural Change
TPB	Theory of Planned Behaviour
TTM	Transtheoretical Model
WHO	World Health Organization

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CHAPTER 1 INTRODUCTION

1.1 Context

The current climate crisis calls for greater efforts than ever to reduce Greenhouse Gas (GHG) emissions. In Quebec, GHG emissions from the transport sector account for 44.8% of all emissions, while road transport alone accounts for 33.4% of the total (Gouvernement du Québec, 2026). Furthermore, transport is one of few sectors in Quebec where emissions continue to grow annually (Ministère de l'Environnement et de la Lutte contre les changements climatiques, 2021). What's more, Quebec is seeing a growing reliance on cars: between 2006 and 2023, the size of the vehicle fleet grew by 30.1%, whilst the population increased by only 16.7% (Institut de la statistique du Québec, 2025).

Meanwhile, we are currently witnessing a significant crisis of sedentary lifestyles and a decline in physical activity across the population. Canadian guidelines for adults recommend not exceeding 9 hours of sedentary behaviour per day. Between 2022 and 2024, Canadian adults spent an average of 9.3 hours a day being sedentary, and only 42% of the population met the guidelines. Among young people aged 12 to 17, the average is 10.6 hours of sedentary behaviour per day (Statistics Canada, 2025). In addition to an increase in sedentary behaviour, levels of physical activity are also insufficient. Indeed, the percentage of Quebecers who do not meet the minimum physical activity thresholds recommended by the World Health Organization (WHO) is 81% among 5–17-year-olds, 48% among 18–44-year-olds and 53% among 45–64-year-olds (Lavoie and Harvey, 2023). We also know that a sedentary lifestyle and physical inactivity are significant risk factors for the development of several health issues (obesity, cardiovascular disease, diabetes, increased risk of mortality, etc.) (Ajufo et al., 2025; Young et al., 2016; Chaput et al., 2023). What's more, excessive sedentary behaviour imposes significant costs on the healthcare system. In 2021, these costs were estimated at $2.2 billion per year (Chaput et al., 2023; Lavoie and Harvey, 2023).

Active transport offers a highly promising solution for reducing GHG emissions whilst increasing levels of physical activity. In return, a more active population helps to reduce the burden on the healthcare system. Regularly commuting by bicycle for a distance of just 3 kilometres contributes to improving physical fitness (Hendriksen et al., 2000). Active modes of transport also have immense potential to replace short-distance motorised journeys. Using data from the 2013 OD survey in Montreal, Morency et al. (2020) determined that, among motorised journeys, 5.2% could be replaced by walking and 19.4% could be replaced by cycling. Thus, when latent active travel is taken into account, the modal shares of walking

and cycling could increase from 10.1% to 14.7% and from 1.6% to 18.7% respectively. These figures show that there is significant untapped potential when it comes to active travel.

Although the benefits of cycling as a mode of transport are well documented and widely recognised, it still accounts for only a small proportion of journeys. This raises the question of why cycling is not adopted on a wider scale across the population. One of the key problems in shifting transport behaviour is breaking current habits. Since people travel to the same places almost every day, transport quickly becomes a habit, one they follow automatically rather than consciously evaluating the conditions of each journey.

Understanding why people do not cycle and what might nudge them toward doing so requires looking beyond infrastructure and into the psychology of behaviour change. To that end, this research examines bicycle behaviour and habits from a cycling stage of change perspective, through two approaches: 1) whether a targeted information campaign can be used at a key life stage to stimulate new bicycle behaviour; and 2) how an individual's stage of change shapes their approach to cycling and what their deal breakers are.

1.2 Research objectives

The main goal of this work is to **examine the role of information in accompanying behaviour change toward cycling through the lens of stages of change**. This main objective is divided into specific objectives (SO):

- SO1: Assess the effectiveness of different types of informative packages in promoting shifts in cycling behaviours, attitudes, and stages of change among first-year university students;
- SO2: Investigate the perceived barriers and deal breakers to utilitarian cycling by individuals at different cycling stages of change.

CHAPTER 2 LITERATURE REVIEW

When studying behaviour relating to transport mode choices, it is essential to incorporate an element of behavioural psychology. As humans are complex beings with diverse motivations, their choices are not always purely rational. This highlights some limitations of utility theory in transport (Avineri and Prashker, 2004), which assumes that individuals make fully rational decisions aimed at maximizing their personal utility. Consequently, using mathematical models to predict their choices can sometimes prove difficult. For example, if a model assumes that individuals will make transport choices to minimise their journey time, it might conclude that a person will always choose the mode that minimises this time. However, a person might choose to walk for 25 minutes rather than take a free bus for 10 minutes, because they dislike being crammed in with other passengers, want to get some exercise, or simply prefer to enjoy the scenery. On the other hand, the next day they might decide to take the bus because they are tired and do not feel like walking. There are therefore contradictions even within one individual, which makes it difficult to predict mobility behaviour. Thus, the study of mobility behaviour is intrinsically linked with the human performing this behaviour. For this reason, this literature review examines both concepts related to cycling and what has been done to increase its uptake, as well as theories of human behaviour applied to cycling.

This review also incorporates the deal breaker perspective developed by Kelcie Ralph. Individuals vary in their perceptions and abilities: a distance considered reasonable by one person may be too far for another, and tolerance for mixed traffic can differ substantially. These limits, or deal breakers, may prevent individuals from cycling altogether. Exploring how these thresholds relate to stages of change can help inform strategies aimed toward shifting people along the stages. Incorporating this perspective also helps to better understand why individuals who express positive attitudes toward cycling may nonetheless choose not to cycle.

2.1 Cycling for transport

Utility cycling, which refers to cycling for transport rather than leisure, can be motivated by many reasons. For starters, many people chose to commute by bicycle for the physical health and fitness advantages that this mode procures (Useche et al., 2019). Going to work or to school by bicycle helps people stay active and keeps them in better physical shape.

Further, the convenience of cycling often acts as an enabler (Bhandal and Noonan, 2022).

Especially in cities, cyclists highlight that it can be a more time efficient mode of transport than the car, public transport, or walking (Useche et al., 2019; Bhandal and Noonan, 2022). The convenience of cycling is also evident in the fact that it eliminates concerns about parking a vehicle and reduces dependence on public transit, which, depending on the context, may not always run reliably.

People also chose to cycle because it has positive effects on mental health and well being, and can even be 'therapeutic' (Bhandal and Noonan, 2022; Singleton, 2019). For some people, cycling is simply a fun and enjoyable way to get around.

The economic factor is also an important motivator (Useche et al., 2019; Bhandal and Noonan, 2022; Heinen et al., 2010). Owning and operating a bicycle is much less of a financial burden than a car, or even public transport. The bicycle is a very cost-effective way to get around.

Cycling is also a way to travel that is very environmentally friendly, and this acts as a motivator for some cyclists. Not only does a bicycle not emit any GHG emissions, it also reduces noise pollution (Heinen et al., 2010).

Conversely, various barriers to cycling exist: inclement weather, safety concerns, fear of theft, lack of proper infrastructure, challenging topography and lack of social acceptance(Heinen et al., 2010; Piatkowski and Bopp, 2021; Useche et al., 2019; Singleton, 2019). These barriers highlight that, despite its many advantages, cycling uptake is not solely a matter of individual preference, but is strongly shaped by external conditions. As a result, many interventions have been developed to address these challenges and promote cycling as a viable mode of transport. Some of these interventions are presented in the following section.

2.1.1 Interventions to increase cycling for transport

Many different aspects can be tackled when designing an intervention to promote cycling. Cycling behaviour is strongly shaped by the built environment, as factors such as street design, traffic conditions, and the availability of cycling infrastructure directly influence whether people choose to cycle. Hence, interventions on the built environment, such as building new cycling infrastructure and temporarily or permanently pedestrianising streets, can positively affect active travel (Aldred, 2019). A recent systematic review with meta-analysis by Pearson et al. (2025), drawing on 106 studies, confirms that changes to the physical environment, such as adding new cycleways and traffic calming measures, had the highest impact on increasing cycling duration among the intervention types examined.

Interventions can also focus on changing people's behaviours and daily habits. For example, personalised travel plans that suggest cycling routes based on a person's home and workplace

are sometimes used. As routes have already been scouted, these programs help people feel more confident about trying cycling for commuting (Larsen et al., 2024). Pearson et al. (2025) found that increases in walking for transport were most strongly supported by educational and persuasion programs, particularly individually tailored behavioural programs, suggesting that this type of approach may be more effective at shifting walking behaviour than cycling behaviour specifically.

Another type of intervention is workplace-based interventions. As most people travel to work on a (almost) daily basis, an increase in cycling for working commute trips can have significant impacts. Workplace interventions include offering access to showers, lockers, and secure bicycle parking. Financial incentives are also used, such as offering free or subsidised bicycles to employees (Larsen et al., 2024) and cash-out on employer subsidised parking (Evangelinos et al., 2018). Équiterre's Vélovolt project is a recent example of a successful workplace-based measure. In this project, participants could borrow an electric bicycle for 2-4 weeks and use it for their daily trips. Assessments of the campaign results indicate that 42% of participants changed their working commute transport habits after having tested the e-bike. Among these participants, cycling, walking, and public transit use increased by respectively 42%, 23%, and 10% (Équiterre, 2024). Pearson et al. (2025) similarly identify workplace-based interventions as effective at increasing active transport, particularly walking.

Training programs are another common example of interventions to promote cycling. These can include cycling skills courses or safety workshops, which aim to reduce fear and improve confidence, especially among new or less experienced cyclists. Vélo Québec's Toutes à vélo is a local example of such programs, specifically designed for women (Vélo Québec, 2026). In the school context, Pearson et al. (2025) found that a bicycle bus was associated with a 42% increase in levels of cycling to school, while a walking school bus led to a 38% increase in overall active transport levels, suggesting that structured, group-based programs can be particularly effective for younger populations.

Evidence suggests that promoting cycling is most effective when multiple intervention tools are used together (Scheepers et al., 2014), as no single approach can address all the factors influencing cycling behaviour. An important limitation noted by Pearson et al. (2025), however, is that studies in this field often suffer from significant methodological weaknesses, making findings difficult to generalise or apply. Furthermore, the measures used to assess change vary considerably across studies, rendering direct comparisons between interventions difficult or sometimes impossible. The authors call for more high-quality evidence to better understand the effects of, and interactions between, the different interventions aimed at increasing cycling levels, a sentiment echoed by Yang et al. (2010)

2.2 Models of behaviour change and their application to cycling

Several behavioural psychology theories argue that behavioural change does not happen instantly. On the contrary, individuals evolve in a sometimes non-linear process that is characterised by several distinct phases. The number of phases and the characteristics that differentiate each of them vary between models. The following sections outline some theories that support this view.

2.2.1 Habit discontinuity hypothesis

Transport behaviour is often habitual. Daily trips, such as commuting to work or school, usually follow stable routines and do not involve much thought process, which contributes to reinforcing these habits. As a result, once a travel mode is established, it can be difficult to change. This is why interventions often need to disrupt existing routines or target key moments of change, such as moving house or starting a new job. Following the idea that transport behaviour is shaped by habits, the habit discontinuity hypothesis helps explain when and how patterns can be disrupted to promote change.

The habit discontinuity hypothesis is not a model of behaviour change per se. Rather, this hypothesis proposes a condition under which behaviour change becomes more likely. When a behaviour is carried out repeatedly and performed in the same settings, whether physical or psychological, it becomes a habit. These settings are called the context in which a behaviour takes place. Many events can contribute to disrupting a context, such as changing jobs, moving into a new home, or having a child. Transport behaviour is not immune to habit formation. Furthermore, habits have an influence on information seeking.

In an application to travel behaviour, Aarts et al. (1997) found that individuals with strong mobility behaviour habits did not seek information about other alternatives and current conditions when compared to individuals with weaker habits. If the context in which a habitual behaviour takes place is disrupted or modified, the habit itself is also at least temporarily broken (Wood et al., 2005). As a result, the *habit discontinuity hypothesis* posits that when a person has a change in their context that disrupts their habits, there is a time-frame during which they are more susceptible to reconsider habits and potentially change their behaviour (Verplanken et al., 2008). Therefore, at that specific time, information relevant to different choices of behaviour can become more important and influential (Verplanken et al., 2008; Verplanken and Wood, 2006).

A typical context change targeted by many studies is residential relocation. Verplanken and Roy (2016) tested 25 environmental behaviours among 2 experimental groups sampled from

university students and staff at a small university in England: recent movers and non-movers. Half of each of these groups received information promoting sustainable behaviours. Car use to get to campus was one of the behaviours measured. Results showed that the informational intervention was more effective among people who had recently moved. This study also suggests that the time-frame during which individuals are more likely to change, called the window of opportunity, lasted three months after the residential relocation (Verplanken and Roy, 2016).

Residential relocation as an opportunity to change behaviour was also studied by Ralph and Brown (2019). They conducted an experiment among incoming graduate students at the University of California, Los Angeles, in which half of the participants received a transportation guide by email. This guide contained information about available public transit routes, cycling, walking, and parking options near campus. Among their 617 participants, results indicated that the intervention altered the travel patterns of students who had recently relocated, but had no significant effect on those who had not moved. More specifically, movers exhibited an increase in public transit use and a decrease in car use. Regarding active modes of transport, however, the information package had no significant effect on either movers or non-movers.

Even if an individual is at a transition point where they may be more likely to change, if they have never previously considered a behaviour such as cycling, providing information on how cycling works may not be relevant. Such individuals may first need to be convinced that there is a reason to change. In this context, theories such as the Transtheoretical Model are useful for understanding the types of changes (e.g., attitudes and behaviours) that may occur.

2.2.2 Transtheoretical model

The Transtheoretical Model (TTM) was originally elaborated by Prochaska and DiClemente (1983) to address quitting smoking. This model posits that behaviour change is not an instant process. Rather, individuals progress through different stages, called stages of change, until they attain the desired behaviour. The model counts five major stages. In the first stage, called precontemplation, an individual is not aware of their problem behaviour and has no intention to change in the foreseeable future (six months). These individuals are often unaware of the consequences of their problem behaviour, as they might be uninformed or underinformed. In the next stage, called contemplation, individuals become aware that a change in their behaviour is necessary, and they plan to do so in the next six months. An ambivalence exists at this time, as individuals are aware of the benefits of changing, but are

also aware of the costs. This ambivalence can keep individuals stuck in the contemplation stage for a while. Next, individuals progress to the preparation stage, during which they intend to take action in the next month. They have made a plan to support their change strategy, for example consulting a counsellor. An individual in the fourth stage, called the action stage, has changed their problem behaviour in the past six months. Finally, the maintenance stage applies to individuals who have maintained their changed behaviour during at least six months, and are actively working to prevent relapse. Relapse, referring to the regression to an earlier stage, can happen during any of the stages (Prochaska and Velicer, 1997; Friman et al., 2017; Bamberg, 2013b).

The TTM also elaborates a set of 10 processes of change, such as consciousness raising (e.g., seeking information about the problem behaviour), that individuals use during their movement through the stages of change (Prochaska and DiClemente, 1983; Prochaska and Velicer, 1997). However, this aspect of the model is not included in the present study. The processes of change are not included as the focus of this study is on assessing stage progression following an intervention, rather than on the mechanisms through which that progression occurs.

Since its elaboration, the TTM has been used to influence behaviour in many fields, such as weight management (de Freitas et al., 2020; Mastellos et al., 2014), levels of physical activity (Romain et al., 2018) alcohol and substance abuse (Migneault et al., 2005), and sexual health and HIV prevention (Prochaska et al., 1994). Along with those areas of study, it has also been applied to transport.

Gatersleben and Appleton (2007) relied on the TTM framework to design a study intended to encourage university staff and students in the UK to cycle to work. Their study confirmed that in progressing from the precontemplation to the action stage, individual attitudes become more favourable toward cycling. They also find that perceived barriers change according to Stages of Change (SOC). These results highlight the need for different strategies and information types to help people in different stages progress toward higher bicycle SOC. They also found that content about how commuting by bicycle is convenient and flexible had a more significant impact on individual behaviours than highlighting environmental or health benefits (Gatersleben and Appleton, 2007). Since flexibility is immediately experienced during every trip, its effects are more tangible and have a bigger incidence on behaviour than long term environmental and health impacts, a concept also known as future discounting.

The TTM was also used by Diniz et al. (2015), who tested an educational content intervention among factory workers in Brazil aiming to increase rates of cycling to work. During a 6 month period, participants in the experimental group took part in activities that promoted

cycling by highlighting its health and environmental benefits as well as safe cycling. The activities were specifically built upon the TTM's processes of change. Although cycling rates did slightly increase after the experiment, no statistically significant difference between the control and experimental groups was found.

2.2.3 Stage model of self-regulated behaviour change

The Stage Model of Self-Regulated Behavioural Change (SSBC) was developed by Bamberg (2013b) specifically to change environmentally harmful behaviours. This model takes its core concepts from the Model of Action Phases (MAP) (Heckhausen and Gollwitzer, 1987), while incorporating constructs from the Norm-Activation Model (NAM) (Schwartz and Howard, 1981) and the theory of planned behaviour (TPB) (Ajzen, 1991). It also proposes a more consistent theoretical framework to address the main criticisms directed at the TTM, i.e., that the stage boundaries are logically incorrect, and that the time frames assigned to each stage are arbitrarily defined, with thresholds such as 30 days and 6 months lacking theoretical justification beyond their original application to smoking cessation (Sutton, 2000; Bamberg, 2013b).

The SSBC views individual behaviour change as a progression through four different stages: predecision, preaction, action, and postaction. In each of these stages, a person must accomplish a task to progress to the subsequent stage. Three distinct intention types arise while passing from one stage to another. This model also posits that behaviour change is self-regulated: individuals must invest active effort, namely to set goals, develop strategies, and revise them adequately (Bamberg, 2013b).

In the predecision stage, the individual reflects on conflictual wishes related to the problematic behaviour with the aim to transform some of these wishes into binding goals. For example, a person might consider the dilemma between travelling quickly in their car or in a more environmentally friendly manner. These binding goals result in *goal intention*, which marks the transition to the next stage, preaction. Building on the previous example, the individual's goal intention could be that they intend to reduce their private car use.

In the preaction stage, the individual's task is to select which behavioural strategy will be used to accomplish the goal they formed. After weighing different options, the individual will commit to one of the options, which is termed as a *behavioural intention*. For example, said individual might decide to use an active mode for their commute to work instead of their car. This leads the individual to the third stage, the action stage.

For the action stage, the individual's task is to actually start performing the new behaviour,

made possible by forming an *implementation intention*. Continuing the example, the implementation intention of our individual could state that starting on Monday morning, they will wake up 30 minutes earlier than usual, bring a change of clothes, and wear their running shoes to walk to work. Finally, as individuals define an implementation intention, they progress to the postaction stage.

In the postaction stage, individuals have two tasks: determine what has been accomplished and decide if further action is necessary to reach their goals, as well as work to prevent relapse (i.e. returning to their previous behaviour) (Bamberg, 2013b,a; Zarabi et al., 2025).

In developing his theory, one key premise put forward by Bamberg (2013b) is the importance of developing interventions tailored to specific SOC rather than generalised interventions applied across the board.

Keller et al. (2019) published a review looking at applications of the SSBC to environmental behaviours. The review revealed that studies using stage tailored informative interventions significantly influenced behaviour and stage progression. Such interventions outperformed non-tailored information or no information at all. However, methodological issues with the studies reviewed highlight that more research is necessary to assess the effectiveness of stage tailored informative interventions. An important limit flagged by Keller et al. (2019), not only for the SSBC but more generally, is related to measuring behaviour. As most measures of behaviour are self-reported, biases can be introduced, which also extend to stage association. To further ensure the SSBC model's validity, it is necessary to validate stage diagnosis measures in practice. Keller et al. (2019) also mention the limit associated with viewing behaviour change in a stage model as a linear and static process, hence omitting the complexity related to the context and feedback loops that occur in real-life decision making.

Specifically in the field of transport, Bamberg (2013a) tested an interventional study designed to reduce car use for everyday trips in Berlin. The study used a phone-based social marketing campaign and designed stage tailored interventions. According to the tasks needing to be accomplished in each of the four stages elaborated in the SSBC, a phone dialogue module was elaborated for each stage. Two treatments were tested: i) based on their current stage, participants interacted with an individual following the dialogue module correspondent to the participant's stage, or ii) participants received a printed standardised information package. Results indicated that the stage tailored phone-based interventions significantly helped to reduce motor car use. On the contrary, the standardised information packages distributed to participants (and that did not include any personal contact by phone) had no such effect. Further, the increased use of public transport suggested that car trips were mainly substituted by this mode, while walking and cycling remained unchanged. An important limitation

of this study is the differential treatment accorded to the two experimental groups: while the stage-based phone interventions included personal contact, the standardised information packages did not involve any dialogue. Therefore, because this study's design does not allow differentiation between the method of the intervention (dialogue vs no human dialogue) and the content of the intervention (stage specific vs standardised), the results must be interpreted with caution. Specifically, Bamberg states that this study only validates that offering information through human interaction with dialogue triggers behaviour changes more effectively than information delivery alone.

More recently, Zarabi et al. (2025) applied constructs from the SSBC to examine how cycling stage of change affects attitudes and perceived barriers toward cycling for transport, using data from 1055 adults in the cities of Montreal and Laval. Reinforcing views stated by Keller et al. (2019), this study brings nuance to the idea that stage progression is always linear and leads to more favourable attitudes and behaviour toward cycling. Findings reveal that some current cyclists in the action stage might be doing so out of necessity rather than by choice (captive riders). These cyclists do not necessarily have positive attitudes toward cycling and view it as their current mode until a more favourable option becomes available. If barriers are reduced, these individuals might go back to using the car. As such, Zarabi et al. state that intervention policies that promote cycling should not only concentrate on people that are not currently cycling (preaction stages), but also be aimed toward encouraging current (captive) cyclists to remain engaged in this behaviour. This study also revealed that traffic danger and fear of theft are more important perceived barriers for people that would like to start cycling but have not yet started to do so. Investing in adequate cycling infrastructure could help these individuals progress in their stage of change.

A study conducted by Sunio et al. (2018) specifically looked at travel behaviour change within the university student population at a university in Manila, Philippines, using the SSBC as a theoretical framework. They used a technology-based intervention to promote reduction of car use in favour of shared rides services, including public transport. Study participants accessed informative content through a website and smartphone applications. This study did not specifically tailor information to a participant's SOC: different types of information were accessible, and participants chose which information interested them most. The results indicated that the technology-based interventions successfully helped participants to advance in the stages of change related to the car, hence leading to a reduction in car use.

Building on the TTM and SSBC, Olsson et al. (2018) developed a six stage conceptualisation, where the lowest stage from the SSBC is divided into 2 stages: predicision denial, where the individual sees no reason to change, and predicision inhibition, where the individual

feels it is impossible to change. The six stages of their conceptualisation are as follows: predecision denial, predecision inhibition, preaction, action, postaction, and maintenance. Olsson et al. (2021) applied this six stage model to asses whether a cycling campaign was effective to change travel behaviour. The campaign consisted of a 30-day springtime bike-to-work event in Sweden, with employees participating on a voluntary basis. Three different nudging conditions were tested to encourage people to participate, based either on financial incentive, environmental benefits, or social norms. The results showed that no nudging condition outperformed another.

An important distinction to highlight is that SOC progression implies opposite behaviour when considering car use compared to cycling. For SOC related to the car, an individual at a low stage mainly uses the car and sees no reason to change. Moving toward higher stages involves a **reduction** of car use and less favourable attitudes toward the car. On the other hand, for cycling, an individual at a low SOC does not cycle and does not intend to change this situation. Progression toward higher stages therefore involves more favourable attitudes toward cycling and an **increase** in bicycle use.

Olsson et al. (2021) also found that this cycling campaign effectively stimulated progression toward higher SOC for the car, which in turn reduced car behaviour and favoured an increase in bicycle use. Progression was particularly impressive among participants in the preaction stage, as 70% moved to higher stages three months after the campaign had ended. As such, the authors argue that individuals in this stage are prime targets for interventions oriented toward trying a new behaviour.

2.3 Barriers to utilitarian cycling

Understanding the factors that prevent people from choosing to cycle for transport is a key step in identifying where and how to intervene to promote it. As such, many studies have focused on barriers to utilitarian cycling. Identifying these barriers helps reveal why some individuals do not consider cycling a viable option for everyday trips, even when infrastructure or policies are in place.

Barriers related to safety have been widely studied and consistently identified in the literature (Useche et al., 2019; Heinen et al., 2010; Piatkowski and Bopp, 2021; Naseri et al., 2026). A recent literature review by Pearson et al. (2023) further confirms that safety is the most significant barrier to cycling. In their review article, Piatkowski and Bopp (2021) reveal that safety as a barrier to cycling is cited more often by women than by men among non-cyclists, although this difference is not observed among more experienced cyclists. Safety barriers

are most often understood from a traffic safety perspective, including factors such as high traffic volumes, the need to share road space with motorised vehicles, and the resulting fear of injury.

While safety barriers are often framed in terms of traffic safety, they can also relate to personal safety. For instance, sharing the road space with car users can lead to unwanted negative interactions or intimidating behaviours. Lack of respect for cyclists (Useche et al., 2019), aggressive drivers and feeling threatened on the road renders cycling much less attractive (Bhandal and Noonan, 2022). In addition, Piatkowski and Bopp (2021) found that women are less comfortable riding on on-off street paths than men, as these isolated paths can reduce their sense of personal safety. Women are therefore forced to consider the trade-off between traffic safety and personal safety.

Pearson et al. (2023) also find infrastructure-related barriers as being among the most frequently cited: insufficient quantity and quality of cycle lanes, lack of connectivity in the cycle network, and poor road conditions.

Extreme weather conditions are often cited as a barrier to cycling (Useche et al., 2019). However, Piatkowski and Bopp (2021) found that it is only a barrier for newer cyclists. Once people have adopted cycling behaviour, inclement weather is less of a deterrent factor.

Other barriers relate to personal reasons: needing to shower at destination, lack of fitness, lack of appropriate knowledge for bicycle maintenance, no genuine interest, lack of comfort, or not owning appropriate clothing (Pearson et al., 2023).

Literature shows that several barriers exist and are well documented. However, the tipping points are not clearly defined. Moreover, these tipping points are likely to vary depending on cycling SOC. For example, a distance considered acceptable by a regular cyclist might be deemed unacceptable by someone thinking about taking up cycling.

As such, to further enhance our understanding of barriers, it is useful to examine them in relation to individuals' cycling stage of change. Nkurunziza et al. (2012) found that individuals at lower stages of change perceive more barriers to cycling than those at higher stages. For example, in their study, individuals in the precontemplation stage report that they would feel strange riding a bicycle.

In a study conducted among staff and PhD students at a university in the UK, Van Bekkum et al. (2011) further support differences in perceived barriers according to bicycle SOC. Their results indicate that barriers to utility cycling incrementally decrease from the precontemplation stage to the maintenance stage. For instance, individuals in the precontemplation stage perceive showering and access to changing facilities as more important barriers than those in

the maintenance stage. Individuals in the preparation stage also hold more positive perceptions toward cycling than those in the precontemplation or contemplation stages. As such, offering opportunities for more experienced cyclists to interact with individuals in the preparation stage and share practical tips can help reduce barriers for this group. Van Bekkum et al. (2011) also emphasize the importance of providing appropriate support and information to individuals in the action stage (who have started cycling) to help them maintain their behaviour and avoid relapse.

Recently, Naseri et al. (2026) applied this perspective to the study of cycling barriers in the Montreal context. Their results suggest that individuals in the precontemplation stage highlight stress, the perception that cycling is difficult and slow, as well as the challenges of cycling with bags as key barriers, while traffic danger is not identified as a barrier. Individuals in the contemplation stage were found to report more barriers than those in the precontemplation stage. One explanation is that contemplators actually wish to cycle but perceive barriers as being too important, whereas precontemplators are not thinking about cycling at all. Traffic danger was found to be the most important barrier in the contemplation group, with 80% of individuals agreeing with this statement.

Building on this line of work, Ralph (2025) proposed a conceptualisation of barriers in a deal breaker theory, presented below.

2.3.1 Deal breaker theory for cycling

There is a large pool of untapped potential comprised of people who do not cycle for transport, and understanding why this group does not cycle is why Ralph (2025) conducted this research and proposed the deal breaker theory of cycling.

In this theory, Ralph (2025) proposes that each person has a list of 'must-haves' that must be met in order for them to cycle for transport. People compare their list of needs to prevailing conditions when assessing whether to cycle. If even a single one of these needs is not met, then it becomes a deal breaker and the person will not cycle. If all of their needs are met, than a person might cycle. Ralph proposes five categories of needs: safety, comfort, relative convenience, availability of tools, and social approval. Each of these categories are independent and uncorrelated: people might have high needs in one category and low needs in another. Further, Ralph mentions that needs are sufficiently stable from one day to another, but may vary over longer time periods.

The needs related to safety are easy to interpret. Risk averse individuals have higher safety needs and fearless individuals have lower safety needs. Given the same prevailing conditions,

an individual might have their safety needs met, while for someone else, the conditions are deal breaking.

Comfort needs relate to the pleasure of cycling and include tolerance of poor weather, exertion, or uneven riding surfaces, needs regarding navigation and route finding, as well as needs for personal security and threat of harassment (Ralph, 2025). Some cyclists might accept to pedal through the rain, while for others this is an absolute no. Cyclists with high comfort needs might also refuse to cycle if they have to navigate a new route and are scared of getting lost. Negative interactions with car drivers might also deter cyclists.

Looking at relative convenience needs for cycling for transport involves comparing cycling to other modes of transport, especially the car, in terms of costs (monetary and time), flexibility, and hassle.

Needs concerning the availability of tools relate to three main elements: the type of bicycle, access to secure parking, and bicycle maintenance. For some people, a regular bicycle will satisfy their needs, while others need a specific type of bicycle. For example, a parent might need a cargo bicycle to transport their children, or a person living at a cycling distance from a subway station might need a folding bicycle to bring it aboard public transport. As for access to secure parking, some individuals would only cycle if they knew they would have access to a covered and fully secure parking at their destination. Individuals with low needs might accept to leave their bicycle locked in a less secure area or outside and exposed to the elements. Having basic bicycle repair skills can also influence cycling: if a person does not know how to change a flat tire themself, they will be less confident to cycle farther away from areas with bicycle shops, thus limiting their trip flexibility.

The last category of needs is social approval. For some people, being the only one that cycles in their circle is totally fine; they have low needs. For others, cycling only becomes an option if they know many people doing so and cycling is socially viewed as an acceptable mode of transport.

For all categories of needs, it is important to remember that given the exact same conditions, called the prevailing conditions by Ralph, two individuals might come to different decisions. The person whose needs are met in all five categories might cycle, while the person's whose comfort needs, for example, are higher and are not met will not cycle. Prevailing conditions vary in each location. For example, the conditions in Amsterdam meet the needs of more people than the conditions in Philadelphia. In this sense, Ralph argues that people in Amsterdam are not inherently more 'cycling prone', but rather their needs are met at a greater rate, which is why there is much more cycling there than in Philadelphia.

The deal breaker theory also highlights that *perceived* conditions motivate decisions rather than *objective* conditions. For instance, a person unaware of a high quality cycle path nearby (we can imagine a REV segment in Montreal) perceives safety conditions being lower than they objectively are. Their safety needs are therefore not *perceived* as being met, while *objectively*, they are met.

2.4 Synthesis of the literature review

People choose to cycle for transport for a variety of reasons. Many highlight its low cost, flexibility, and the reduced constraints associated with car parking. For others, environmental and/or physical fitness benefits serve as the primary motivation. Finally, some individuals are drawn to cycling simply because it is enjoyable and pleasant. To promote utility cycling, a wide range of measures have been implemented and tested, including advertising campaigns, workplace cycling initiatives, training courses, the expansion of cycling infrastructure, and the pedestrianisation of streets.

However, theories of human behaviour suggest that changes to the built environment alone are often insufficient to shift travel behaviours. In this context, the habit discontinuity hypothesis emphasizes that transport behaviours are largely habitual. Changing such behaviours requires first disrupting existing habits, which typically occurs during a change in context, such as starting a new job. This transition period, often referred to as a window of opportunity, makes individuals more receptive to information and more likely to reconsider their travel choices. That said, behaviour change is rarely immediate, which highlights the relevance of models such as the Transtheoretical Model and the Stage Model of Self-Regulated Behavioural Change.

According to these models, individuals move through a series of distinct stages, known as stages of change. Understanding the characteristics of individuals at each stage, as well as the processes involved in progressing through them, allows for the development of targeted interventions. Such interventions are better suited to individuals' needs and are more likely to support meaningful behavioural change.

It is also essential to identify the barriers to utility cycling and to examine how these barriers vary across the stages of change. While these barriers have been widely studied, the tipping points that trigger behavioural shifts remain less well understood. In this regard, Ralph's concept of deal breakers provides a useful framework for identifying the critical thresholds that may prevent individuals from adopting cycling.

By combining all this knowledge, it is possible to better understand what prevents individuals

from cycling, to identify their specific limits or deal breakers, and to determine how, where, and for whom interventions can be most effectively implemented to encourage the uptake of cycling for transport.

The present research, divided into two studies, incorporates concepts from the theories presented in the literature review. Building on the habit discontinuity hypothesis and previous studies looking at how interventions can promote sustainable behaviours in travel mode choice for university students (Sunio et al., 2018; Ralph and Brown, 2019), the first study aims to use a simple, low cost informative intervention to promote progression in bicycle SOC. The second study uses the SOC framework to asses how deal breakers from Ralph's theory differ according to stage membership.

CHAPTER 3 CONCEPTUAL FRAMEWORK

The conceptual framework, as shown in Figure 3.1, illustrates the logical links between the key concepts under study.

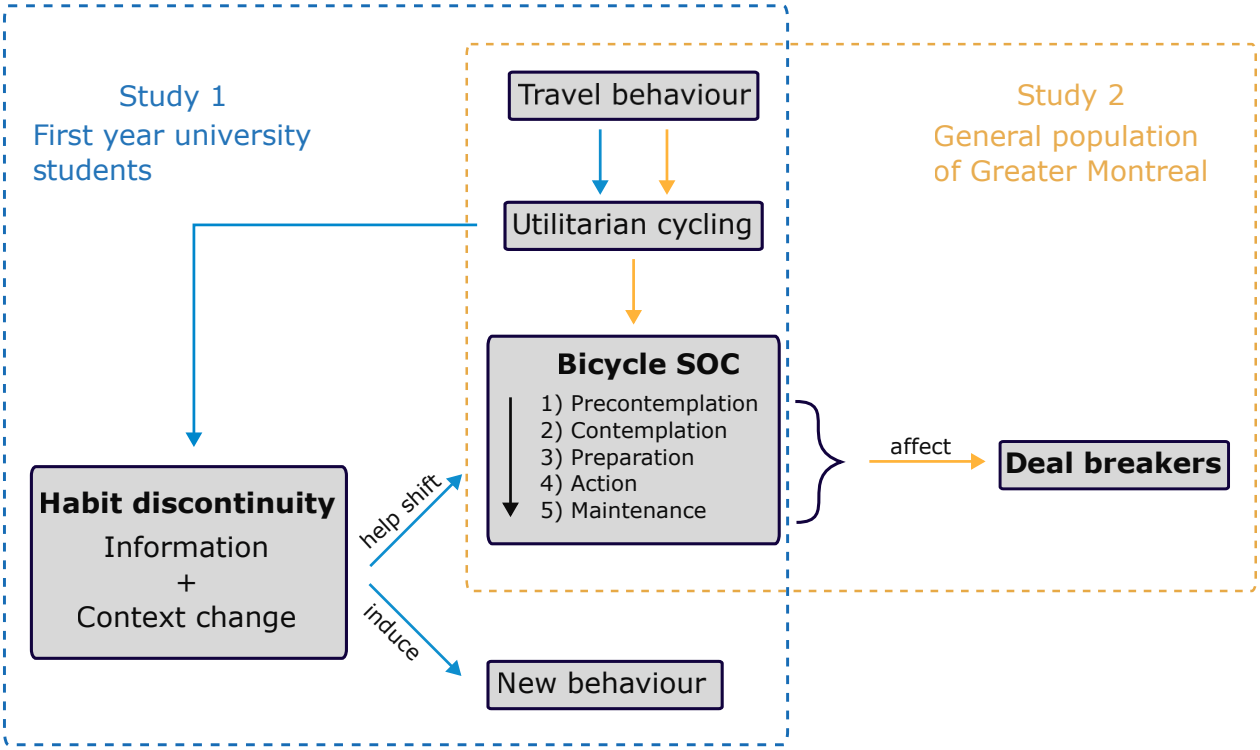


Figure 3.1 Conceptual framework

This research examines travel behaviour, with a specific focus on cycling for transport. The first study, highlighted in blue in the figure, approaches cycling through the lens of habit discontinuity theory. The study population consists of first-year university students at Polytechnique Montréal. As they have just begun attending a new destination to pursue their studies, these students have recently experienced a change of context. This point of habit disruption provides an opportunity to introduce information about cycling as a mode of transport and to assess whether this informational intervention encourages progression through the cycling stages of change, or leads to the trial of new cycling behaviours. This first study addresses the first specific objective (SO1) of the research.

The habit discontinuity hypothesis and the TTM are complementary frameworks that, together, inform the design and analysis of the first study. Habitual behaviour, by definition, is performed automatically and without deliberate reflection. Individuals who cycle rarely or

not at all, and who have settled into a routine of using other modes of transport, are unlikely to spontaneously reconsider their travel choices. In TTM terms, these individuals are likely in the precontemplation or contemplation stages: they are either unaware of, or not yet motivated to consider, cycling as a viable option for their daily trips. The habit discontinuity hypothesis suggests that a change of context, such as beginning university studies at a new institution, disrupts existing routines and creates a window of openness to behaviour change. This moment of disruption lowers the psychological barrier to reconsideration, making individuals more receptive to new information and more likely to progress through the stages of change for cycling.

This is why first-year students at Polytechnique Montréal represent a particularly relevant study population: their recent change of destination constitutes a natural habit discontinuity, which the informational intervention is designed to leverage. Rather than attempting to shift entrenched behaviour, the intervention targets individuals at a moment when their routines are already disrupted. The stages of change based on the TTM provide the analytical framework used to assess whether exposure to information about cycling is associated with progression toward greater readiness to cycle, or with the trial of new cycling behaviours altogether.

The second study, shown in orange, focuses instead on the general population of Greater Montreal. Where the first study examines whether individuals can be moved toward cycling adoption during a moment of habit discontinuity, the second study takes a broader view and asks why many people do not cycle at all, or do not cycle more. To answer this, it draws on two complementary frameworks: the stages of change from the TTM, and the deal breaker theory of cycling developed by Ralph (2025).

The SOC provide a way to segment the population according to their current relationship with cycling, from those who have never considered it (precontemplation) to those who cycle regularly (maintenance). Research suggests that perceived barriers to cycling, that is, the factors people cite as preventing them from cycling, differ meaningfully across these stages (Naseri et al., 2026). Someone in the precontemplation stage may cite safety concerns or lack of infrastructure, while someone in the preparation stage may be more focused on practical barriers such as trip distance or weather. Understanding how barriers vary by stage is therefore essential for designing targeted interventions.

The deal breaker framework offers a complementary and more precise way to conceptualise these barriers. Rather than treating barriers as binary obstacles that either prevent or allow cycling, the deal breaker concept acknowledges that individuals have thresholds. A condition that is only seen as inconvenient for a regular cyclist may be a complete deal breaker for

someone who has never cycled for transport. In this sense, the stages of change and the deal breaker framework are directly linked. A person's stage of change may shape how they perceive and weigh potential barriers: what constitutes a deal breaker is likely to differ across stages, though not in a strictly linear way. For instance, a regular cyclist may have developed strategies to cope with conditions that a non-cyclist would find prohibitive. By examining deal breakers alongside stages of change, the second study moves beyond simply identifying barriers and toward understanding the relative weight individuals assign to them depending on where they stand in their cycling trajectory. This second study helps to achieve the second specific objective (SO2) of the research.

CHAPTER 4 STUDENT POPULATION EXPERIMENT

This chapter details the experiment with first-year university students at Polytechnique Montréal. The goal of this experiment is to determine whether students could be influenced by information to either shift them along the bicycle SOC, and even be nudged into trying BIXI, Montreal's station based bicycle sharing system.

Building on the habit discontinuity hypothesis (Verplanken et al., 2008), the study was designed to target first-year university students at the beginning of the semester. This timing was chosen to capitalise on both the significant context change (starting to study at a new school, i.e travel to a new destination) as well as the 'window of opportunity' during which habits are more susceptible to change (beginning of the first semester).

This study also builds upon concepts from models of behavioural change to assess stage of change evolution. While our study uses the TTM framework elaborated by Prochaska and DiClemente (1983), it does not include the time frame component. In fact, in the TTM, stages are linked to a behaviour state and a time frame, e.g., I plan to take action in the next 6 months. In this sense, the stage of change framework used is more similar to the SSBC. In the present context, the study could not include any indicator of time, since seasons had to be accounted for. The first two surveys were distributed in September and October respectively. With winter on it's way, it is unrealistic for most people to state that they will cycle in the next 6 months (as only a small percentage of the cyclist population in Montreal continues to cycle during the winter season).

In this study, the SOC classification follows the approach used in the broader research project (*ACCEPTER le vélo*) and that was published in recent articles (Naseri et al., 2026; Zarabi et al., 2025). As such, SOC was assessed using a single multiple choice question based on the framing from the SSBC model elaborated by (Bamberg, 2013b). The statements used as well as the corresponding SOC classification for the car and the bicycle are shown in Table A.1. It is important to mention that the Preparation 1 and Preparation 2 stages are sometimes grouped for analyses. The full table including classification for public transport and walking is available in Appendix A.

4.1 Methods

The first step in implementing this project was to establish contact with teachers at Polytechnique Montréal responsible for orientation courses across the 12 engineering programmes

Table 4.1 Stages of change for the car and the bicycle

Mode	**Stage of change**	**Statement(s)**
Car	Precontemplation	I mainly use the car, I am satisfied and see no reason to reduce my car use.
	Contemplation	I mainly use the car, I would like to reduce my car use but I feel it is impossible.
	Preparation 1	I mainly use the car, I am considering reducing my car use, but I am unsure how or when to do so.
	Preparation 2	I sometimes use other modes of transport, but I still mainly use the car. My goal is to reduce my current car use. I know which trips to replace and which mode of transport to use, but I haven't started doing so regularly yet.
	Action/Potential relapse	I don't drive or don't have access to a car, I plan to use a car in the future.
	Maintenance	I don't drive or don't have access to a car, I plan to maintain this situation in the future. & I do not use the car very often. I try to use other modes of transport as much as possible. I will maintain or reduce my car use in the upcoming months.
Bicycle	Precontemplation	I rarely or never do trips by bike, I am satisfied and see no reason to change this situation.
	Contemplation	I rarely or never do trips by bike, I would like to do more, but I feel it is impossible.
	Preparation 1	I rarely or never do trips by bike, I would like to do more, but I don't know how nor when to do so.
	Preparation 2	I rarely or never do trips by bike. My goal is to start to do more soon. I know which trips to replace, which route to take, but I haven't started doing it regularly yet.
	Action/Potential relapse	I often do trips by bike, but I am not sure I will continue to do so in the future.
	Maintenance	I often do trips by bike, I will maintain or increase the number of trips I do by bike in the upcoming months.

offered. Because of their lighter course material, orientation courses for the different engineering disciplines were targeted. Eight different professors from five engineering programmes agreed to participate in the research project. For the professors, participation mainly consisted of allowing us 20 minutes of their class time to present content to their students. Each class of students was then assigned to one of four distinct groups: experimental groups 1, 2 and 3 (E1, E2, E3), and a control group (C). The characteristics of the different groups are presented in Table 4.2. The groups were formed with the objective of diversifying the types of engineering in each group, while attempting to have a similar number of students in every group. The control group was chosen because it was the most diverse group and would therefore limit potential issues related to the type of individual who might enroll in the different engineering disciplines.

Table 4.2 Treatment group characteristics

Group type	**Engineering programs**	**Number of enrolled students**	**Content presented**
Control (C)	Civil Electrical Mechanical	220	N.A.
Experimental 1 (E1)	Electrical Mechanical	150	Impacts of the car
Experimental 2 (E2)	Electrical Mechanical	144	Why use your bike + Tips & tricks
Experimental 3 (E3)	Chemical Electrical	142	Why use your bike + Tips & tricks & Impacts of the car

As one of the study's objectives was to assess which types of information are most effective in supporting the adoption of new travel behaviours and progression along the bicycle stages of change, three types of interventions were tested.

The content presented to group E1 focused mainly on the impacts of car culture, including individual consequences (high monetary cost, increased sedentary behaviour linked to transport) and social consequences (GHG emissions, infrastructure costs, danger to others). The objective was to raise awareness of the issues associated with excessive car use. The benefits of active transport and the mobility component of Polytechnique's sustainable development objectives were also presented in this intervention, with the aim of conveying an injunctive norm.

The E2 presentation focused solely on cycling: why do it and how practical and flexible it is, the BIXI service and how to use it, as well as some cycling-specific tips (access to Polytechnique's community bicycle repair workshop, activities organised by Vélo Québec, etc.). Research has shown that highlighting flexibility of the bicycle is most relevant for people who are often stuck in traffic or depend on public transit (Gatersleben and Appleton, 2007). Most first year university students do not (yet) own a car and are more dependent on public transit. Furthermore, as most students in their first year have busy time-tables requiring them to be on campus for full days, they tend to commute during rush hour, making them more likely to be stuck in traffic if they commute by car. The combination of these two factors makes them ideal candidates to respond to the bicycle's flexibility. Olsson et al. (2021) have also found that individuals in the preaction stage (are planning to change their behaviour but have not done so yet) are prime targets for interventions oriented toward trying new behaviours, which is why the content related to trying BIXI is included in the E2 intervention.

The third presentation (E3) combined information from the two other interventions. All of the content of the three interventions presented to the students is included in Appendix B.

Students participating in the research project were asked to complete a short survey before the scheduled date of the intervention (*survey 1, pre-intervention*). The questionnaire covered socio-demographics (age, gender, residential location), stages of change (SOC) for all modes, and mobility-related attributes (bicycle and driver's licence possession) and behaviours (past and current mode use, public transit pass ownership).

Some teachers allotted time in class to complete the survey, while others simply uploaded the link to the survey on the course's website (Moodle) and asked students to complete it in their own time. For all experimental groups, the interventions took place during September 2024, as early as possible to seize the 'window of opportunity' described by Verplanken and Roy (2016), during which students have undergone a context change and have not yet established new habits.

Then, in October 2024, approximately one month after the first survey was distributed and the intervention for the experimental groups took place, a second survey was distributed, this time by email (*survey 2, post-intervention 1*). To encourage participation, a social plea was used: the email inviting students to complete the survey emphasised that their continued participation would contribute to the successful completion of the researcher's master's project. The second questionnaire was very similar to the first, with a few modifications. All the baseline socio-demographic questions were removed, as well as questions related to their historic usage of certain transport modes (i.e., public transit usage during age 6-12), as this

information does not change and only needs to be collected once. To assess whether the interventions had impacted students' behaviour, questions about trying BIXI and perceptions of different transport modes were added. A final question about residential relocation was also included.

A third and final questionnaire was sent to students towards the end of April, beginning of May, 2025 (*survey 3, post-intervention 2*). Compared to the second survey, this one included more questions regarding BIXI: having the app on a smartphone, usage during the winter and summer seasons, and intention to use during the summer season. This survey also included a question related to remembering the intervention and its content. The same social plea technique used to encourage participation in the second survey was also employed for the third survey. All three surveys, along with their corresponding consent forms, can be found in Appendices C, D, and E.

In order to encourage as many students as possible to respond, the time required to complete a survey had to be kept as short as possible (approximately 7 to 10 minutes for the first survey). It was therefore necessary to find a balance between the number of questions asked and the time taken to complete the survey. For this reason, only the questions deemed essential were included in the first survey. However, as the socio-demographic questions were removed for the second and third surveys, it was possible to add new questions whilst maintaining a similar completion time. For this reason, the opportunity was taken to add a question regarding support for different modes of transport in the last two survey waves.

The number of complete responses for surveys 1, 2, and 3 was respectively 539, 310, and 146. With a retention rate of 58% from the first to the second survey, there were concerns that the number of responses for the third survey would be too low. Therefore, to encourage participation in the last survey, a financial incentive was introduced: students who completed the third survey were eligible to win one of two $200 gift cards at a major retail store of their choice. Ultimately, 122 people fully completed all three rounds of surveys. An explanation of the limitations associated with a small sample can be found in section 4.4.

All survey data were collected using the Lime Survey platform and analyses were performed using RStudio.

4.2 Results

The pre-intervention survey collected 539 responses from first-year university students at Polytechnique. The main characteristics of the sample are presented below.

- **Age**: Mean age of 19.87 years. 88% are aged 18-21;

- **Gender**: 62% men, 38% women and gender diverse;
- **Engineering program**:
  Aerospace: 37 students (6.86%)
  Chemical: 98 students (18.18%)
  Civil: 99 students (18.37%)
  Electrical: 140 students (25.97%)
  Mechanical: 163 students (30.24%)
  Other: 2 students (0.38%);
- **Driver's licence**: 87% of students have a driver's licence ;
- **OPUS card membership (public transit)**: In September 2024, 11% have a 4 month pass, 74% have a monthly pass, 7% have individual tickets, and 7% have no tickets or passes;
- **Bicycle ownership**: 61% own a bicycle (either regular or electric);
- **Bixi use in the past 12 months**: 74% have not used it, 26% used it (with 6% having an active membership).

An imbalance in gender is observed in the sample. However, this reflects the broader composition of Polytechnique Montréal, where approximately one-third of the student population are women. Electrical and mechanical engineering account for more than half of the sample. The data also indicate that the vast majority of students hold a driver's licence and use public transit, with three-quarters of the sample reporting possession of a monthly transit pass. In addition, more than half of the respondents own a functional bicycle, while approximately three-quarters report not having used BIXI in the past 12 months.

The first survey also measured the current SOC for car, bicycle, walking, and public transport (PT). Figure 4.1 presents the distribution of respondents across the different SOC categories for the full sample. Figures 4.2 and 4.3 show the SOC for the bicycle and the car, while considering the different treatment groups. Students were also asked to report the transport mode used for their most recent trip to Polytechnique, as shown in Figure 4.4.

Figure 4.1 shows that almost 75% of the sample is in the Action/Potential relapse or Maintenance stages for the car, which suggests that most students do not rely on a car for the majority of their trips. This is further supported by the fact that walking and public transit are predominantly represented in the higher stages of change, revealing that most trips are done using these modes. In contrast, the bicycle exhibits the opposite trend: only about

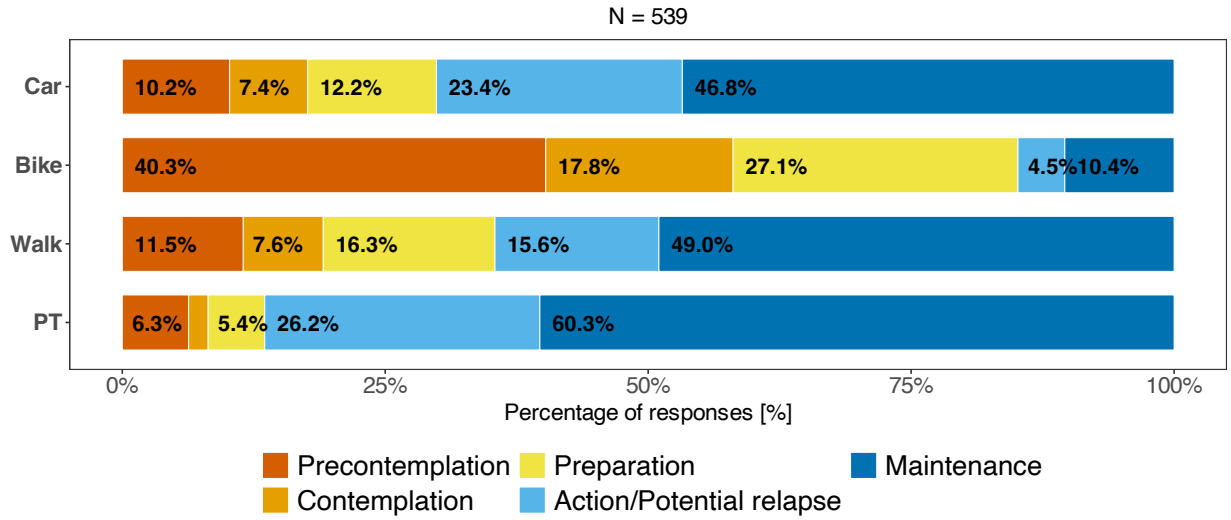


Figure 4.1 SOC measured in the first survey (September 2024)

15% of respondents are currently cycling (Action/Potential relapse or Maintenance), while 40% do not cycle and are not interested in doing so (Precontemplation). Nevertheless, a substantial share of the sample (around 45%) is not currently cycling but expresses interest in doing so, indicating a significant pool of untapped potential. Cycling also has the largest proportion of respondents in the Preparation stage compared to the other modes.

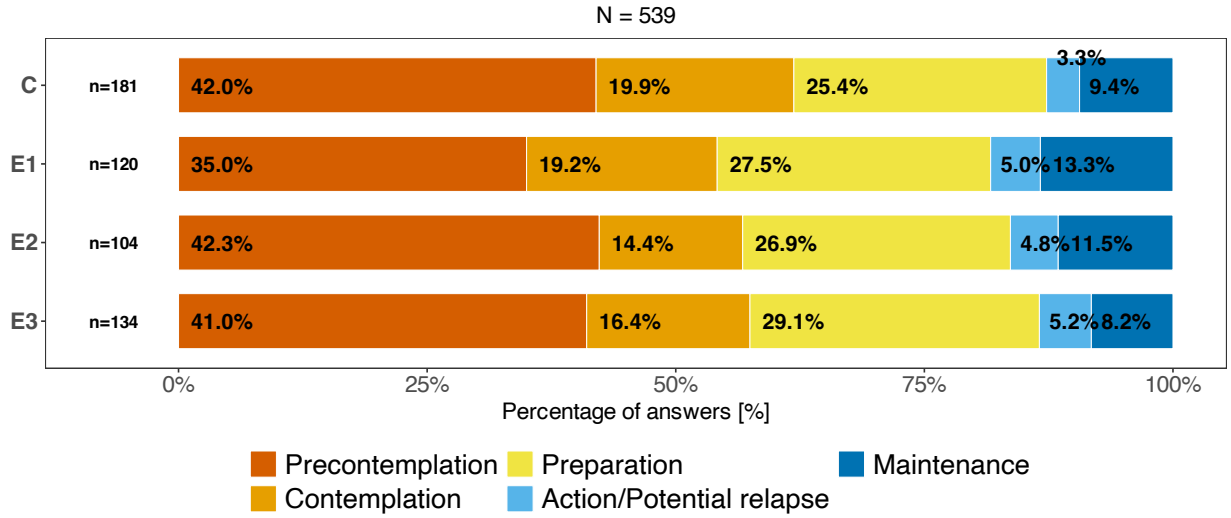


Figure 4.2 Cycling SOC measured in the first survey (September 2024) by treatment group

Figure 4.2 shows that the distribution of cycling SOC is similar across groups, with pre-

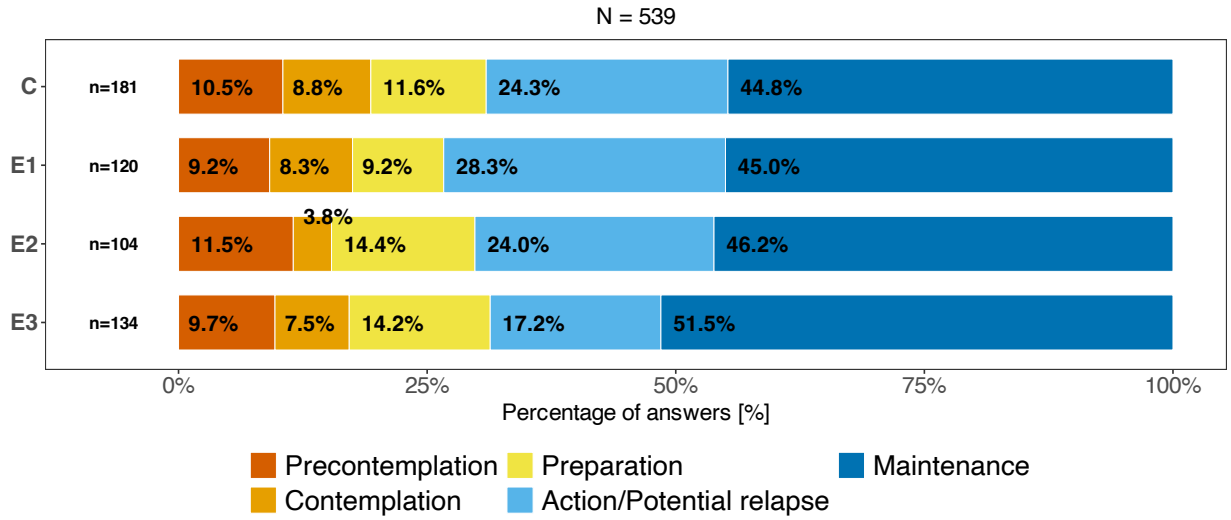


Figure 4.3 Car SOC measured in the first survey (September 2024) by treatment group

contemplation being the dominant stage in all four groups. The E1 group shows a slightly lower proportion of participants in the precontemplation stage (35.0%) compared to the other groups (ranging from 41.0% to 42.3%), alongside a somewhat higher proportion in the maintenance stage (13.3%). As for the car SOC shown in Figure 4.3, the distribution is also sufficiently similar across groups. E2 group does however stand out regarding the small percentage of participants in the contemplation stage (only 3.8% compared to 7.5% to 8.8% in other groups). Both these distributions suggest that at baseline, the randomisation was successful in producing comparable groups with respect to cycling and car SOC.

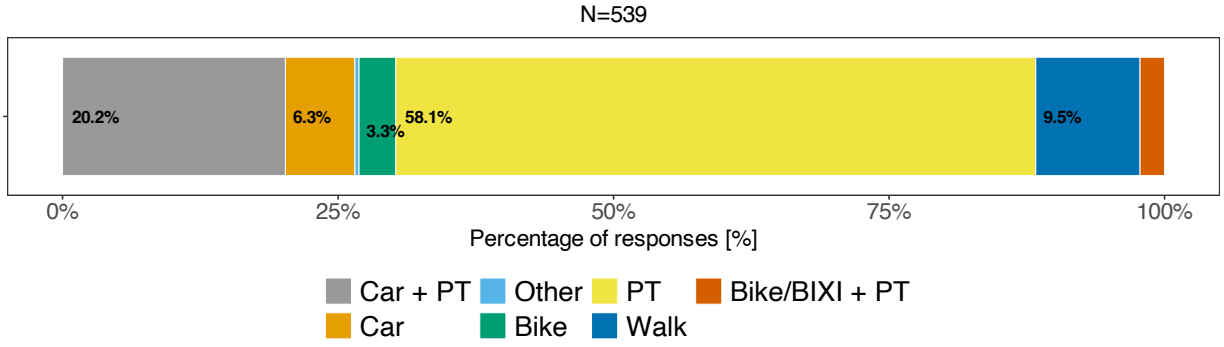


Figure 4.4 Transport modes used for the last trip to Polytechnique in the first survey (September 2024)

Figure 4.4 shows that most students used sustainable modes to reach campus for their most

recent trip. In fact, nearly 60% of trips to Polytechnique were made by public transit and 10% by walking. However, a notable share of the sample (20%) reported using a combination of car and public transit. Only 6% relied exclusively on the car, either as a driver or passenger, as their mode of transport.

The second survey also included the question regarding the transport mode used by students for their most recent trip to Polytechnique (see Figure 4.5).

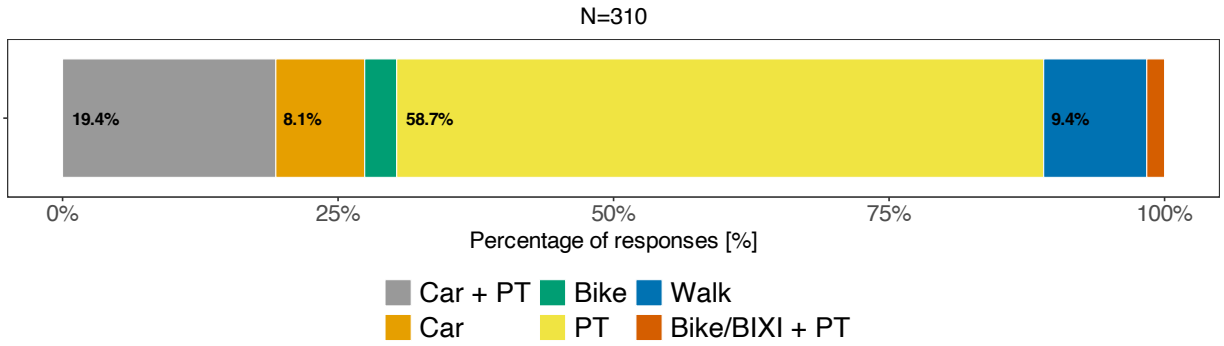


Figure 4.5 Transport modes used for the last trip to Polytechnique in the second survey (October 2024)

When comparing the modes used in the first and second surveys, the modal split does not appear to have changed significantly. The share of trips made exclusively by car increased by just under 2%, while both cycling alone and cycling combined with public transit experienced slight decreases. This pattern is expected, as the second survey took place in October, when the summer cycling season is coming to an end and colder temperatures, along with increased precipitation, may discourage cycling for some respondents.

Nevertheless, it is important to consider that variations related to contextual or short-term factors may also be at play. For example, the weather conditions during a respondent's most recent trip to Polytechnique could have had a significant influence on their choice of transport mode. As such, Figures 4.4 and 4.5 should primarily be interpreted as providing an overview of the modes used by participants rather than as an exact comparison of modal shares between the two surveys.

Further analyses will concentrate on the sample of 122 students who responded to the three rounds of surveys. This allows us to compare the evolution of a group of returning respondents' answers over time. Three main variables are used to determine whether the interventions had an effect on students' attitudes and behaviours: SOC (measured in surveys 1 through 3), BIXI use (measured in surveys 1 through 3), and support for different modes of

transport (measured in surveys 2 and 3). The BIXI use variable is particularly relevant, as the interventions for groups E2 and E3 included content on BIXI and how to use it, allowing us to assess whether this specific information package successfully nudged students to try this new behaviour.

4.2.1 Attrition bias

To better understand the results and detect potential sources of bias, an attrition analysis was conducted. The purpose of this analysis is to determine whether respondents who completed all three rounds of surveys were statistically different from the initial group comprising all respondents. In other words, attrition analyses determine whether certain variables are likely to affect dropout rate. A χ^2 (chi-square) test of independence was performed on several variables from the first survey, comparing the group of people who did not complete all three rounds of surveys (non-completers) to the group that completed all surveys (completers). The null hypothesis is that there is no association between a specific variable and attrition status. Table 4.3 shows the variables studied and the p-value associated with the χ^2 test for each variable. We can see that age, engineering program, and treatment group show a statistically significant association with attrition ($p < 0.05$), and car SOC reaches a higher level of significance ($p < 0.01$). Thus, gender, bicycle SOC, BIXI use during the previous year, and bicycle use during summer 2024 have no statistical relationship with attrition.

However, testing each of these variables one at a time using a χ^2 test has its weaknesses, the main one being that it is impossible to test the effect of a variable completely independently, which can lead to erroneous conclusions. In order to take the analysis further and identify the effect of each variable on attrition independently, a binary logistic regression model was developed. This model makes it possible to determine whether, keeping all other variables constant, a given determinant X has an impact on attrition. That said, it is not possible to include all the variables from Table 4.3 in the binary logistic model as the sample size was too small. As a general rule, 10 to 20 observations are required per degree of freedom. This must be applied to the outcome variable with the smallest count, which is completers (n=122) in our case. Therefore, we can only include $122 \div 10 \approx 12$ degrees of freedom in the model.

When working with categorical variables, each variable consumes a number of degrees of freedom equal to the 'number of categories -1'. For example, the *Treatment group* variable uses $4 - 1 = 3$ degrees of freedom. Considering this, we need to determine which variables are most important to keep for the attrition model, and which ones can be combined into fewer categories, where applicable, or completely dropped.

Table 4.3 Baseline variables from survey 1 tested for attrition bias with a chi-square test

Baseline variable	**Non-completers (n=417)**	**Completers (n=122)**	**Chi-squared p-value**
Age			0.030 (**)
17–18	34 (8.2%)	9 (7.4%)	
19	231 (55.4%)	81 (66.4%)	
20	84 (20.1%)	15 (12.3%)	
21	16 (3.8%)	9 (7.4%)	
22–40	52 (12.5%)	8 (6.6%)	
Gender			0.132
Men	266 (63.8%)	68 (55.7%)	
Women & gender diverse	151 (36.2%)	54 (44.3%)	
Engineering program [1]			0.013 (**)
Aerospace	23 (5.5%)	14 (11.5%)	
Chemical	68 (16.4%)	30 (24.6%)	
Civil	83 (20.0%)	16 (13.1%)	
Electrical	115 (27.7%)	25 (20.5%)	
Mechanical	126 (30.4%)	37 (30.3%)	
Treatment group			0.011 (**)
C	153 (36.7%)	28 (23.0%)	
E1	93 (22.3%)	27 (22.1%)	
E2	79 (18.9%)	25 (20.5%)	
E3	92 (22.1%)	42 (34.4%)	
Bicycle SOC			0.503
Precontemplation	176 (42.2%)	41 (33.6%)	
Contemplation	73 (17.5%)	23 (18.9%)	
Preparation 1	61 (14.6%)	19 (15.6%)	
Preparation 2	46 (11.0%)	20 (16.4%)	
Action/Potential relapse	19 (4.6%)	5 (4.1%)	
Maintenance	42 (10.1%)	14 (11.5%)	
Car SOC			0.006 (***)
Precontemplation	46 (11.0%)	9 (7.4%)	
Contemplation	34 (8.2%)	6 (4.9%)	
Preparation	53 (12.7%)	13 (10.7%)	
Action/Potential relapse	107 (25.7%)	19 (15.6%)	
Maintenance	177 (42.4%)	75 (61.5%)	
BIXI use previous year			0.488
No, not interested	210 (50.4%)	61 (50.0%)	
No, interested	94 (22.5%)	32 (26.2%)	
Yes, active membership	28 (6.7%)	4 (3.3%)	
Yes, no membership	85 (20.4%)	25 (20.5%)	
Bicycle use summer 2024			0.506
Never	199 (47.7%)	57 (46.7%)	
Very rarely	100 (24.0%)	23 (18.9%)	
Sometimes	41 (9.8%)	14 (11.5%)	
Often	77 (18.5%)	28 (23.0%)	

* p-value < 0.1, ** p-value < 0.05, *** p-value < 0.01

[1] For this variable only, two students in other programs (graduate studies and exchange program) were removed from the data

The variable *Age* is removed, as our group is fairly homogeneous: the majority of first-year university students are aged between 19 and 22. Then, correlation between *Bicycle SOC* and *Bicycle use summer 2024* was tested. A Fisher's test p-value of $9.99 \cdot 10^{-5}$ and a Cramér's V of 0.40 with 3 degrees of freedom reveal that these two variables are strongly correlated, indicating that including both in our model is redundant. As *Bicycle SOC* is a pillar of our study, only this variable is kept. Nonetheless, two of its categories are grouped. Previous studies by Zarabi et al. (2025) and Naseri et al. (2026) reveal that individuals in the action stage can be 'captive riders', which means that they are currently cycling out of necessity rather than by choice. It is therefore important to keep this stage distinct from the maintenance phase, where people are actively cycling and wish to pursue doing so. For this reason, the contemplation and preparation stages were merged into a single category. The *Car SOC* is grouped into three categories: people who strictly use the car (precontemplation), people who mainly use the car but also sometimes use other modes (contemplation & preparation), and people who rarely or never use the car (action/potential relapse & maintenance).

An additional model was tested including gender, bicycle SOC, BIXI use in the previous year, car SOC, and engineering program, with treatment group excluded on the grounds that it may act as a proxy for engineering program given the unequal distribution of disciplines across groups. However, this model yielded no statistically significant effects for any engineering program category (Mechanical engineering as reference), and did not outperform the final model in terms of AIC (577.17 vs. 576.44). This indicates that engineering program was acting as a proxy for treatment group assignment, rather than independently predicting attrition. Treatment group was therefore retained in the final model, and engineering program was excluded. The results from the final model are shown in Table 4.4.

Compared to the simple comparison analysis with χ^2 tests (Table 4.3), the binary logistic regression model reveals that age and car SOC are not significant, while bicycle SOC is significant. As we can see in Table 4.4, the most significant ($p<0.01$) determinant of attrition is being part of the E3 treatment group compared to the control group. With an odds ratio of 0.4, participants in this group had 60% lower odds of attrition compared to the control group, which is the reference category. As was shown in Table 4.2, the E3 group was the only one that had students in chemical engineering, while the control group was the only one with civil engineering students. As such, it is not possible to know whether there is some factor associated with these two types of disciplines that might have influenced attrition. Furthermore, a professor teaching one of the classes that was part of the E3 group was particularly cooperative and generous with his time: he allotted time for us to go in class to complete the pre-intervention survey with the students, as well as another session to complete

Table 4.4 Binary logistic regression model of attrition status

Variable	**Category**	**OR**	**95% CI**	**p-value**
Gender	Men (ref)	–	–	–
	Women & gender diverse	0.73	0.47 – 1.14	0.161
Treatment group	C (ref)	–	–	–
	E1	0.65	0.36 – 1.18	0.153
	E2	0.55	0.29 – 1.01	0.054 (*)
	E3	0.41	0.23 – 0.71	0.002 (***)
Bicycle SOC	Precontemplation (ref)	–	–	–
	Contemp. + Prep.	0.63	0.39 – 1.01	0.056 (*)
	Action	0.92	0.33 – 2.96	0.874
	Maintenance	0.59	0.28 – 1.27	0.167
Car SOC	Just car (ref)	–	–	–
	Mainly car	1.08	0.43 – 2.60	0.860
	No car	0.66	0.29 – 1.38	0.299
BIXI use previous year	No (ref)	–	–	–
	Yes	1.41	0.86 – 2.38	0.183

Where OR = Odds Ratio; CI = Confidence Interval; ref = reference category.
Model AIC = 576.44
* p-value <0.1, ** p-value <0.05, *** p-value <0.01

the first post-intervention survey. This was the only group for which we were able to go in class to complete the second survey. It is therefore possible that our repeated presence in class with the students had the effect of making them more invested in the project and eager to complete the three rounds of questionnaires.

At a lower threshold ($p<0.1$), being part of treatment group E2 and being in the contemplation + preparation bicycle SOC are marginally significant. An odds ratio of 0.55 indicates that participants in E2 group had 45% lower odds of attrition compared to the control group. Unlike group E3, no hypothesis is evident to potentially explain the lower attrition rate in this group. As for the bicycle SOC, compared to individuals in the precontemplation stage, individuals in the contemplation + preparation grouped category have 37% lower odds of having dropped out of the study. However, since the 95% confidence interval for these two determinants crosses 1, we cannot draw any firm conclusions on their meaning.

The effect of these attrition determinants in terms of the interpretation of future results are as follows:

- Treatment group: Because the results are always interpreted by differentiating according to the treatment groups, having a larger sample of group E3 does not bias the results. It simply means that there is a larger number of students in group E3 to study.

This also applies to group E2, to a lesser extent, as this determinant is only marginally significant.

- Bicycle SOC: As this determinant of attrition is only marginally significant, we argue that it is unlikely to introduce bias into the interpretation of the results.

4.2.2 BIXI use

The aim of the interventions concerning cycling was to promote the adoption of this mode of transport for all types of trips, not just for commuting to school. Several questions across the three surveys made it possible to qualify and quantify the use of BIXI, Montreal's shared bicycle system.

The interventions presented to experimental groups E2 and E3 included BIXI-related content to assess whether exposure to cycling information, combined with a free one-month membership promotion, would be sufficient to encourage students to try a new behaviour. When the presentations were given in class, incidentally, a BIXI promotion was ongoing for the start of the school year. Students could sign up for BIXI and get a free one-month subscription. The presentations included the promotional code and the complete steps to follow to use the BIXI service, from installing the app to unlocking a bicycle, presented through a homemade instructional video.

In the second survey (post-intervention 1), a question asked students if they had used BIXI since the start of the fall semester. Figure 4.6 shows the respondents' answers to this question. It is important to note that this figure includes responses from all the participants of the second survey, not only those who completed the three surveys. As the objective is to assess BIXI use at that specific point in time, rather than to compare responses longitudinally, restricting the sample to participants who completed all three surveys is not necessary in this case.

As we can see in Figure 4.6, the vast majority of participants reported not having used BIXI. The groups with the highest proportion of people who tried BIXI for the first time were the control and experimental 3 groups, with 6.1% and 6.4% respectively. These two groups also show the highest proportion of respondents stating that they used BIXI since the start of the school term, but the majority of those had already used it previously. Thus, because the control group shows similar results to the experimental groups, we conclude that exposure to the interventions had no significant effect on BIXI trial and usage between the pre and post-intervention 1 surveys.

In the third survey, we asked participants if they had used BIXI: 1) during its winter season

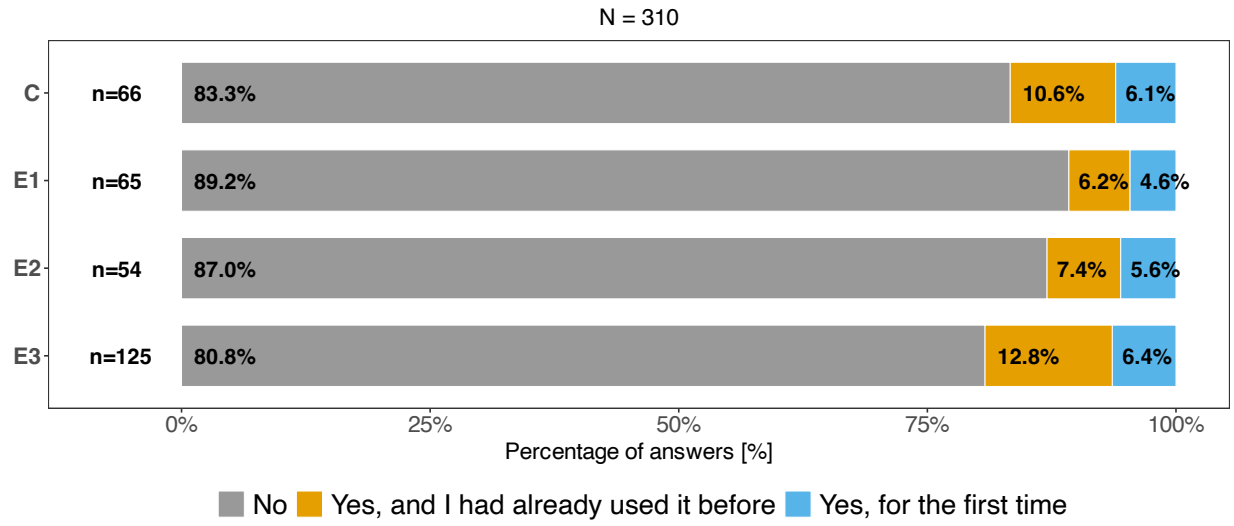


Figure 4.6 BIXI usage in survey 2 according to treatment group

(mid-November to mid-April) and 2) since the start of the summer season (April). Since the questionnaire was distributed in April-May, which is the start of BIXI's summer season, we also asked them if they had the **intention** to use BIXI during the summer season. The results, which only include the sample that completed all three surveys, are shown in Table 4.5 and Figure 4.7.

Table 4.5 BIXI usage during winter and summer 2025 seasons measured in survey 3

	C (n=28)	E1 (n=27)	E2 (n=25)	E3 (n=42)
Did you use BIXI during the winter season (November 2024 to April 2025)				
No	26 (92.9%)	25 (92.6%)	23 (92.0%)	40 (95.2%)
Yes, and I had already used it before	2 (7.1%)	0 (0.0%)	0 (0.0%)	2 (4.8%)
Yes, for the first time	0 (0.0%)	2 (7.4%)	2 (8.0%)	0 (0.0%)
Since the start of the BIXI summer season (April 2025), have you used BIXI?				
No	24 (85.7%)	25 (92.6%)	21 (84.0%)	38 (90.5%)
Yes, and I had already used it before	4 (14.3%)	1 (3.7%)	3 (12.0%)	2 (4.8%)
Yes, for the first time	0 (0.0%)	1 (3.7%)	1 (4.0%)	2 (4.8%)

Table 4.5 shows that very few people used the BIXI winter service, regardless of their treatment group, with only eight of the 122 people having used winter BIXI at any time. In terms of BIXI use since the start of the summer season, there is also no significant effect associated

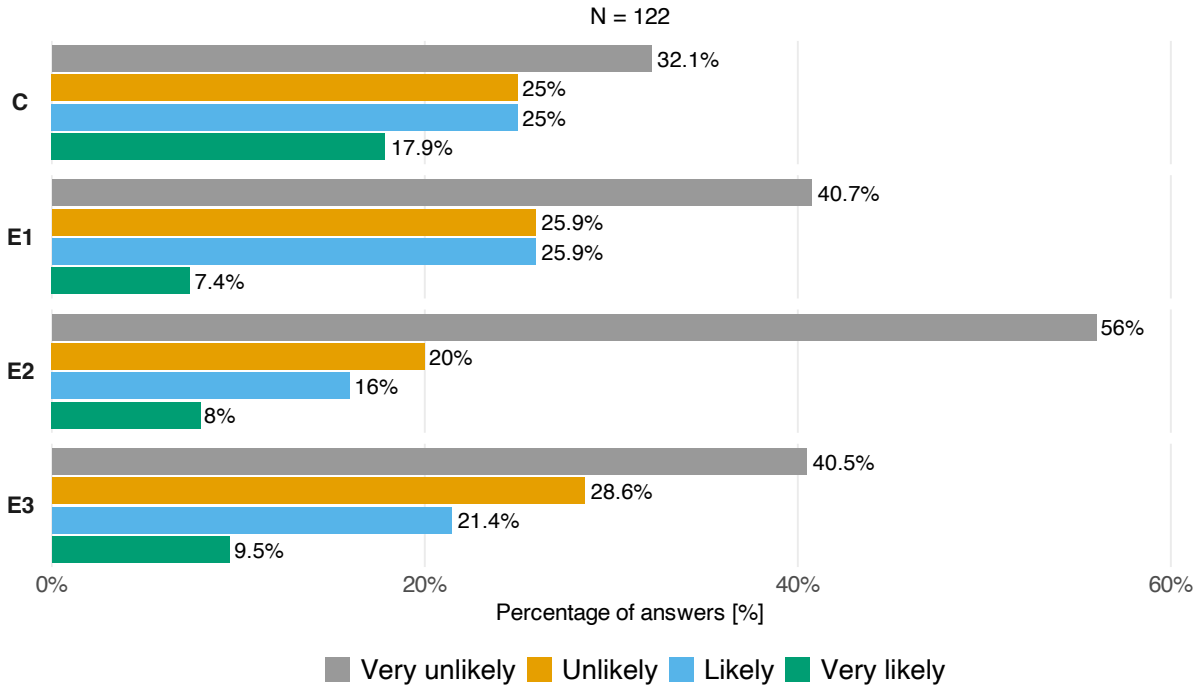


Figure 4.7 Intention to use BIXI during the summer season according to treatment group

with belonging to an experimental group: only one to two people per experimental group tried BIXI for the first time. This number is too small to conclude that the interventions have successfully encouraged students to use or try cycling more as a mode of transport. As for Figure 4.7, which shows BIXI use intentions, it seems to show results that are contrary to those expected. Indeed, the control group has the lowest proportion of people who are 'Very unlikely' and the highest proportion of people who are 'Very likely', even though the latter did not receive any intervention.

Furthermore, we tried to determine if mentioning that Polytechnique students have a discount on BIXI's seasonal membership could have an impact on intention to use the service during the summer. To test this, survey participants were randomly assigned a group during survey completion, and only one of the two groups had a question informing them about the discount. Table 4.6 shows how knowledge of the discount impacted BIXI summer use intention.

As we can see in Table 4.6, being made aware of BIXI's discount for Polytechnique's students did not affect participants' intention to use the service in the summer. In fact, we see a larger proportion of participants claiming they are likely or very likely to use BIXI in the group where the discount was not mentioned compared to the group where the discount was mentioned (respectively 26.6% vs 17.2%; and 14.1% vs 6.9%).

Table 4.6 Intention to use BIXI during the summer season according to exposure to discount

	Discount mentioned (n = 58)	**Discount not mentioned (n = 64)**
Very unlikely	48.3%	35.9%
Unlikely	27.6%	23.4%
Likely	17.2%	26.6%
Very likely	6.9%	14.1%

4.2.3 Stages of change evolution

Given that changing behaviours is a complex and timely process, the SOC framework is used to assess whether the interventions had any impact on attitudes or intentions of students. The SOC of participants was determined using statements describing attitude and intention toward each mode. For example, a participant that selected the answer 'I often do trips by bike, I will maintain or increase the number of trips I do by bike in the upcoming months,' was assigned to the maintenance phase for the bicycle. It should be noted that progression through the stages of change operates in opposite directions depending on the mode: advancing in the stages of change for the car reflects a **reduction** in car use, whereas advancing in the stages of change for the bicycle reflects an **increase** in cycling. The full detail of each statement's association with the appropriate SOC for each mode is included in Appendix A.

The SOC were divided into six distinct stages (precontemplation, contemplation, preparation 1, preparation 2, action/potential relapse, and maintenance), which made it possible to determine whether a participant had progressed, regressed, or remained stable over the course of the study. The figures below show the change in SOC for cycling and driving between surveys 1 and 2, which was a short period of time (about one month), and between surveys 1 and 3, an interval of approximately seven months. Results are shown only for the car and the bicycle, as these are the two intervention topics that were presented to students.

Figure 4.8, illustrating the SOC movement for the bicycle from surveys 1 to 2, shows that the control group (C) is the most stable, with 64.3% of respondents in this category. Indeed, this is to be expected, as this group received no intervention. Group E1 experienced the most fluctuation: 40.7% regressed, while 22% progressed. It is also interesting to note that participants from groups E1 and E3 progressed the most, with a bit more than a fifth of participants moving forward, yet group E1 received the intervention related to the car.

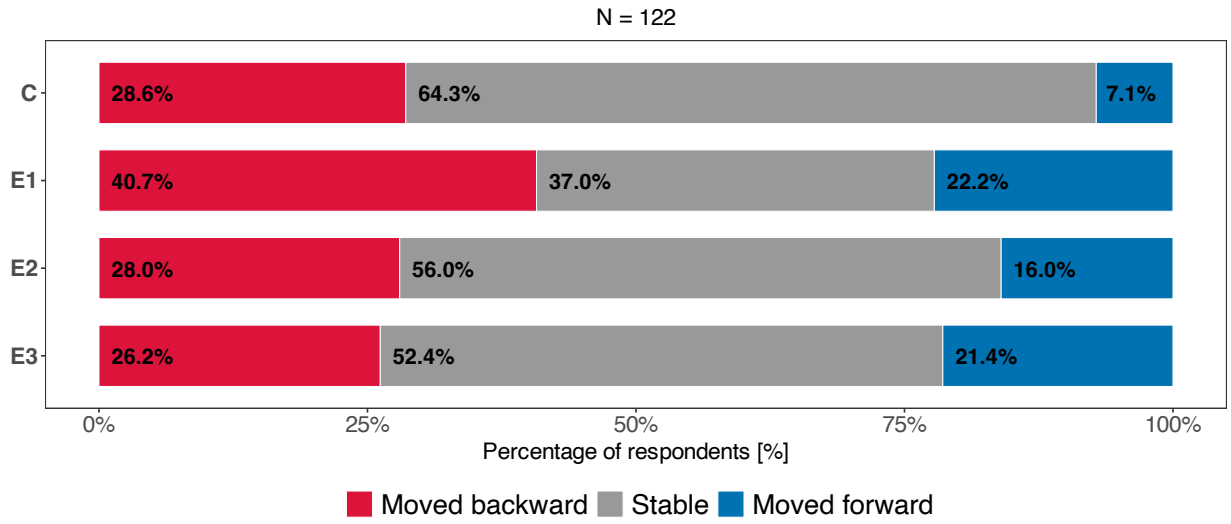


Figure 4.8 Evolution of SOC between surveys 1 and 2 for the bicycle

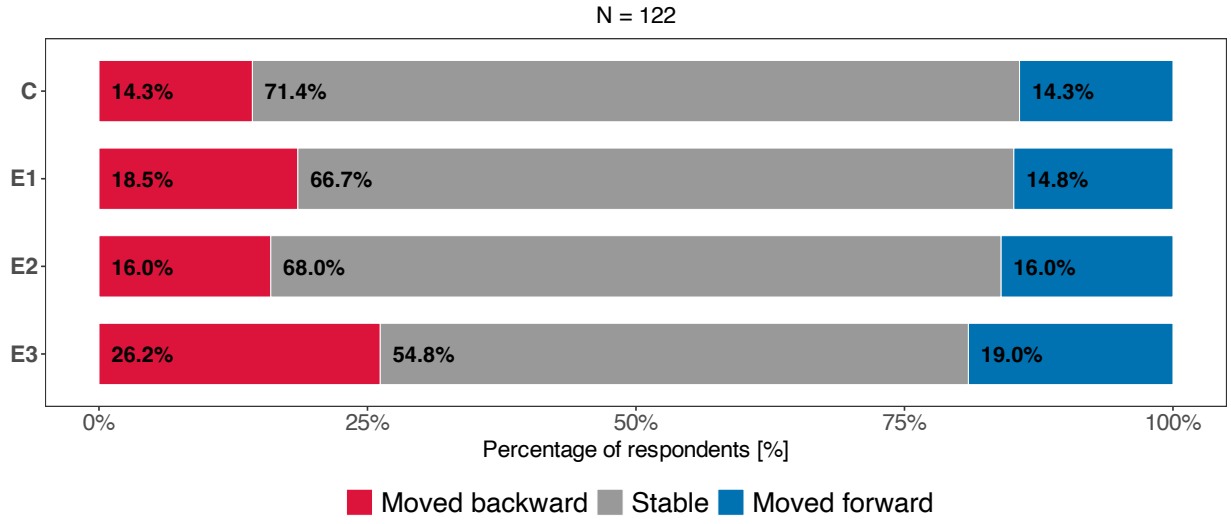


Figure 4.9 Evolution of SOC between surveys 1 and 2 for the car

We can see in figure 4.9 that the majority of participants, regardless of group, fall into the "Stable" category for SOC movement related to the car. There is therefore less movement for this mode of transport compared to the bicycle. This limited movement is consistent with the fact that most students were already at an advanced stage of change for the car at baseline: 70% fell into either the action/potential relapse or maintenance stages in the first survey (see Figure 4.1). Nevertheless, the group showing the most movement is E3, with 26.2% of respondents having moved backward and 19% having moved forward. Although this group

has the highest percentage of regression, it also has the highest percentage of progression, which seems contradictory. In fact, since this group received the mixed intervention (car + bicycle), we would expect less regression than group E2 for example, which only received the bicycle intervention.

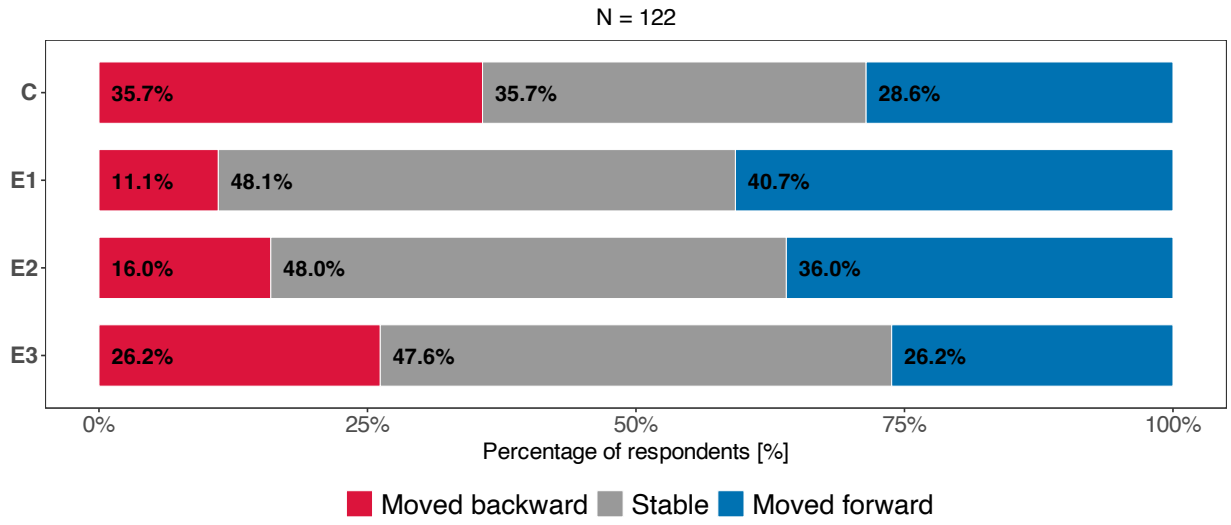


Figure 4.10 Evolution of SOC between surveys 1 and 3 for the bicycle

Figure 4.10 shows that group E1 has the highest proportion of people who moved forward in their SOC for cycling between surveys 1 and 3. However, this result is surprising, as this group only received the car-based intervention. Thus, participants in group E1 moved forward more and regressed less than participants in groups E2 and E3, who received an intervention focused on cycling. Also, we observe that a quarter of participants from group E3 showed regression, again suggesting the limited effects of the intervention.

Similar to figure 4.9, figure 4.11 also shows contradictory results. Groups E1 and E3, both receiving information about the car, show the highest proportions of participants moving forward in terms of SOC for the car, yet also show a higher proportion of participants moving backward than group E2. This again indicates that the interventions had no significant impact on intention and attitude changes.

As a general trend, there is much more stability in the SOC for the car than for the bicycle. These results align with the work of Tertoolen et al. (1998), showing that providing targeted information was insufficient to have any effect on changing car use behaviour. Furthermore, cycling habits are much more affected by seasonal variations. Because the surveys occurred during cycling season changes, this element is important to consider.

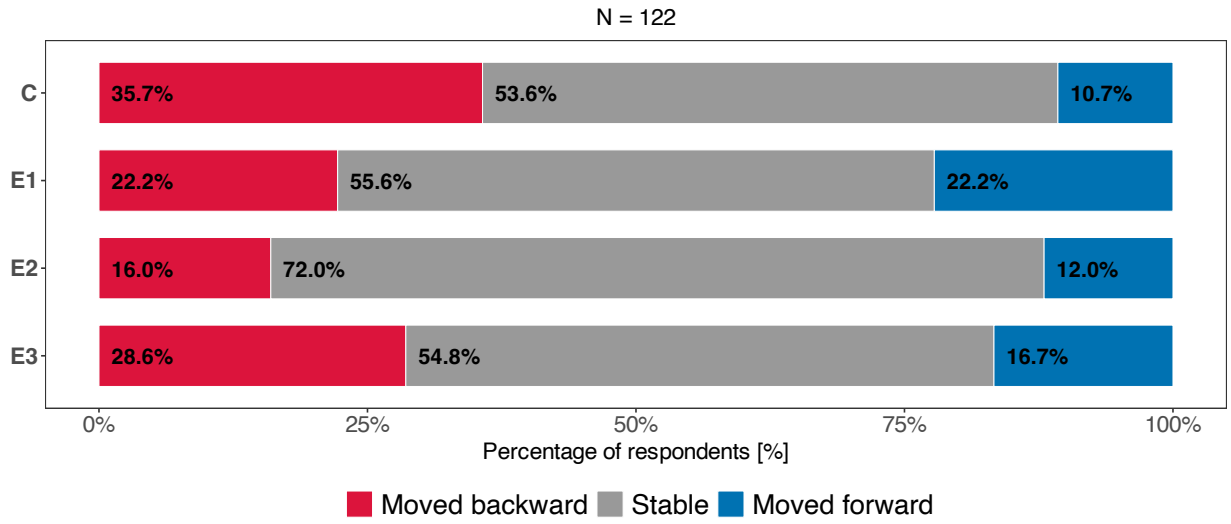


Figure 4.11 Evolution of SOC between surveys 1 and 3 for the car

Finally, χ^2 (chi-squared) and Fisher's exact tests were performed on the data relating to SOC evolution from surveys 1 to 2 and 1 to 3, for the bicycle and the car. Results revealed that none of the test statistics were significant at a threshold of p-value < 0.05. Hence, being part of any group was not associated with significant differences in SOC evolution, for either bicycle or car, across any survey wave (1 to 2 or 1 to 3).

SOC Model

To further understand the relationship between SOC evolution and treatment group, a multinomial logistic regression model was conducted using the nnet package on R. Given that we expect a longer period of time to provide more opportunity to see progress in behaviours or attitudes, the models are based on the evolution of SOC between surveys 1 and 3 for the bicycle and the car. The reference category for the outcome variable, SOC evolution, was 'Stable' and the reference for the predictor variable, treatment group, was the control group (C). The simplest version of the model, including only the outcome variable as well as one predictor, was retained. The addition of predictive variables such as age, gender and engineering program was tested and did not significantly improve the model's performance, revealing that these variables were not confounding in this case.

Both models, shown in Tables 4.7 and 4.8, reveal that almost no results are statistically significant. For the model predicting evolution of bicycle stage of change, we observe that participants in group E1 have marginally significant lower odds of moving backward relative

Table 4.7 Multinomial logistic regression model predicting SOC evolution for cycling between surveys 1 and 3

		Moved Backward vs. Stable			**Moved Forward vs. Stable**		
Variable	**Category**	**RRR**	**95% CI**	**p-value**	**RRR**	**95% CI**	**p-value**
Intercept	C	1.00	0.42 – 2.40	.999	0.80	0.32 – 2.03	.638
Treatment	C (ref)	–	–	–	–	–	–
group	E1	0.23	0.05 – 1.07	.061 (*)	1.06	0.31 – 3.61	.929
	E2	0.33	0.08 – 1.39	.132	0.94	0.26 – 3.34	.921
	E3	0.55	0.18 – 1.73	.306	0.69	0.21 – 2.25	.536

Note: RRR = Relative Risk Ratio; CI = Confidence Interval; ref = reference category.
The intercept represents the baseline odds of each outcome relative to Stable for the reference group (C).
Reference outcome category: Stable. Model fitted using the `nnet` package in R.
* p-value <0.1, ** p-value <0.05, *** p-value <0.01

Table 4.8 Multinomial logistic regression model predicting SOC evolution for the car between surveys 1 and 3

		Moved Backward vs. Stable			**Moved Forward vs. Stable**		
Variable	**Category**	**RRR**	**95% CI**	**p-value**	**RRR**	**95% CI**	**p-value**
Intercept	C	0.67	0.30 – 1.48	.321	0.20	0.06 – 0.69	.011 (**)
Treatment	C (ref)	–	–	–	–	–	–
group	E1	0.60	0.17 – 2.07	.419	2.00	0.42 – 9.51	.384
	E2	0.33	0.09 – 1.28	.110	0.83	0.15 – 4.75	.837
	E3	0.78	0.27 – 2.26	.651	1.52	0.34 – 6.82	.584

Note: RRR = Relative Risk Ratio; CI = Confidence Interval; ref = reference category.
The intercept represents the baseline odds of each outcome relative to Stable for the reference group (C).
Reference outcome category: Stable. Model fitted using the `nnet` package in R.
* p-value <0.1, ** p-value <0.05, *** p-value <0.01

to staying stable than participants in the control group (RRR=0.23, p=0.061). This suggests that participants in group E1 were less likely to regress in their bicycle SOC than participants in the control group, which is surprising considering that group E1 received the car-based intervention. Therefore, we would expect similar bicycle SOC evolution for the control and E1 groups. In table 4.8, we can see that the intercept for the 'Moving Forward vs. Stable' is the only significant result (p=0.011). With a RRR of 0.20, we observe that among participants in group C, the odds of moving forward in car SOC were significantly lower than the odds of staying stable.

4.2.4 Support for different transport modes

Perceptions and attitudes towards different modes of transport were also assessed using slider questions included in surveys 2 and 3. In these questions, respondents had to drag a bar to indicate a numerical response between [-10,10]. Four questions of this type were included in the survey, namely:

- In the context of the Montreal region, should the following modes of transport be supported to a greater or lesser extent? (results shown in Figure 4.12)
- Do you think more or less space should be given to each of these modes? (results shown in Figure 4.13)
- Do the following modes of transport require more or less infrastructure? (results shown in Figure 4.14)
- Do the following modes require a greater or lesser financial investment? (results shown in Figure 4.15)

Responses were classified into three categories based on participants' ratings: negative (scores in [-10, 0[, indicating less of X for a given mode), neutral (score of 0, indicating no change), or positive (scores in]0, 10], indicating more of X). Figures 4.12 through 4.15 present the distribution of responses to the four questions for each transport mode (car, bus, rail, walk, and bicycle), broken down by treatment group (control [C] or experimental [E]) and survey wave (S2 or S3). For example, the label *C.S2* refers to responses from the control group collected during the second survey wave. The three experimental sub-groups were pooled into a single *experimental* category, yielding a binary treatment variable. The mean score for each group–wave combination is displayed to the right of each bar.

Furthermore, Welch's two-sided t-tests were conducted to compare mean responses between the control and experimental groups at each survey wave (C.S2 vs. E.S2 and C.S3 vs. E.S3), for each transport mode and across all four slider questions. At a significance threshold of $p < 0.05$, no statistically significant differences in means were found. This suggests that the interventions had no discernible effect on participants' expressed support, whether general, spatial, infrastructural, or financial, for any of the transport modes examined.

These results should nonetheless be interpreted with caution, as a notable limitation of the study design is that these slider questions were not included in the first survey. This decision was made deliberately, as the first survey already included an important number of socio-demographic questions and keeping completion time as short as possible was a priority. The slider questions were therefore only introduced in surveys two and three, once the

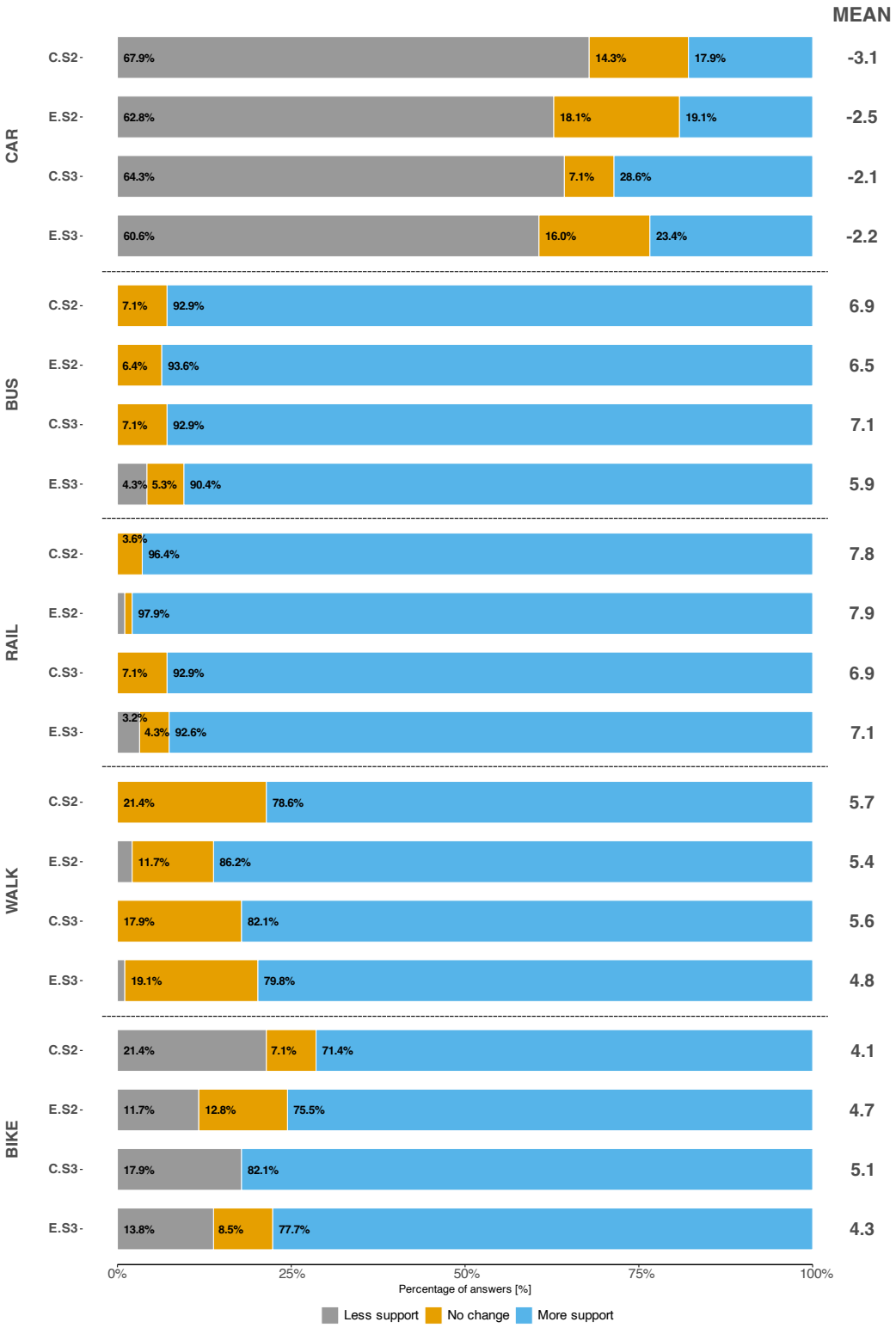


Figure 4.12 Evolution of support for transport modes between surveys 2 and 3 for control and experimental groups

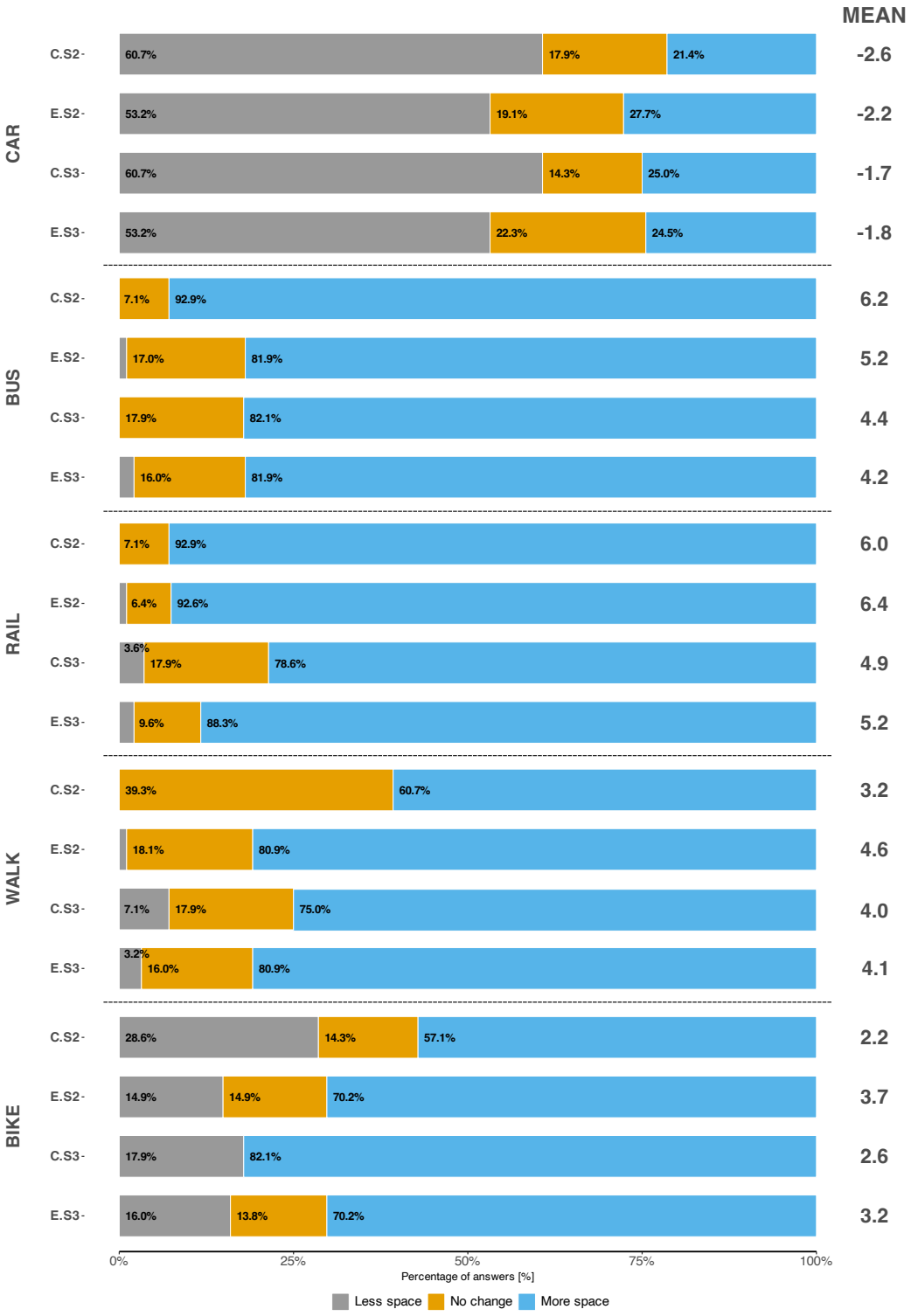


Figure 4.13 Evolution of space allotted to transport modes between surveys 2 and 3 for control and experimental groups

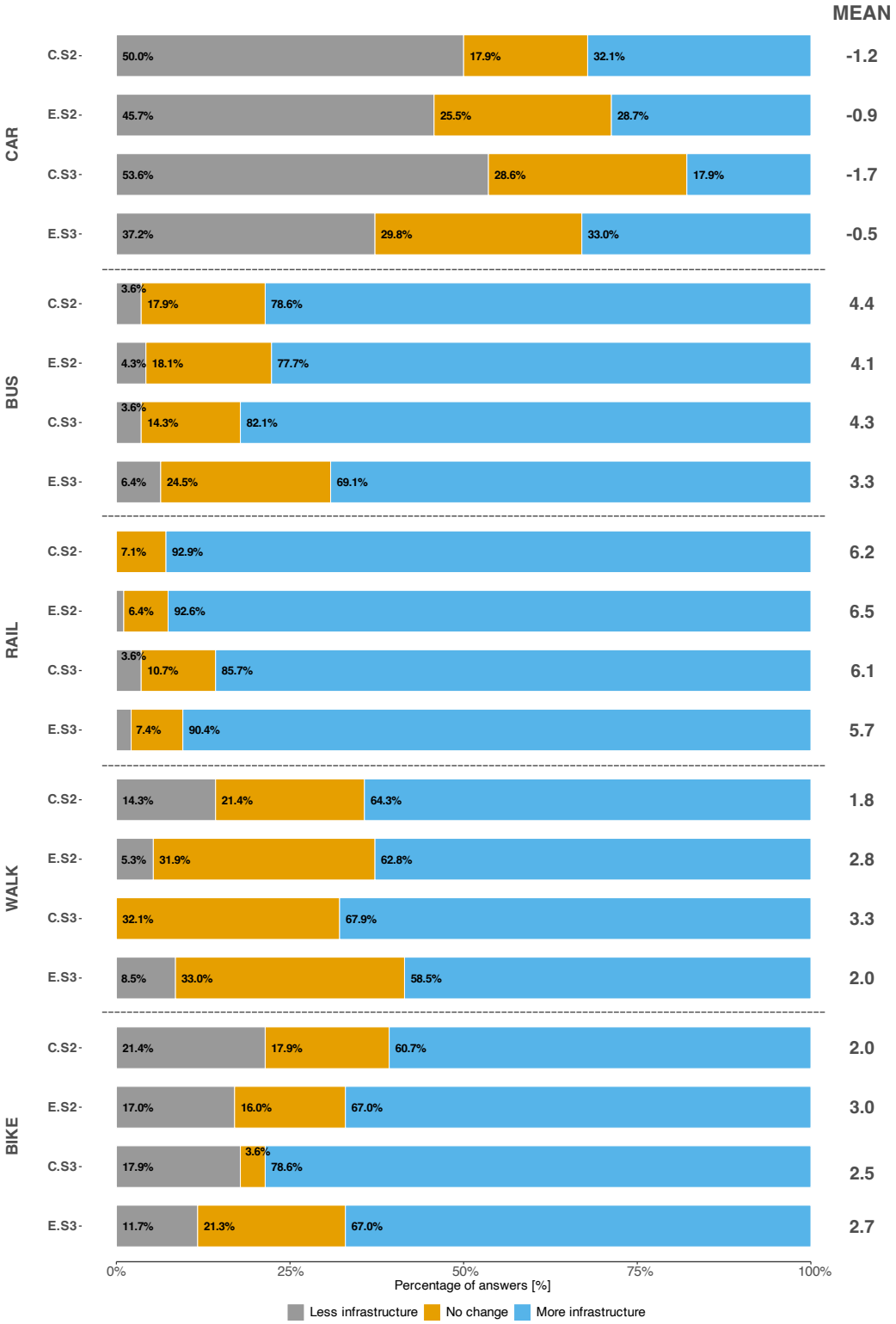


Figure 4.14 Evolution of infrastructure for modes between surveys 2 and 3 for control and experimental groups

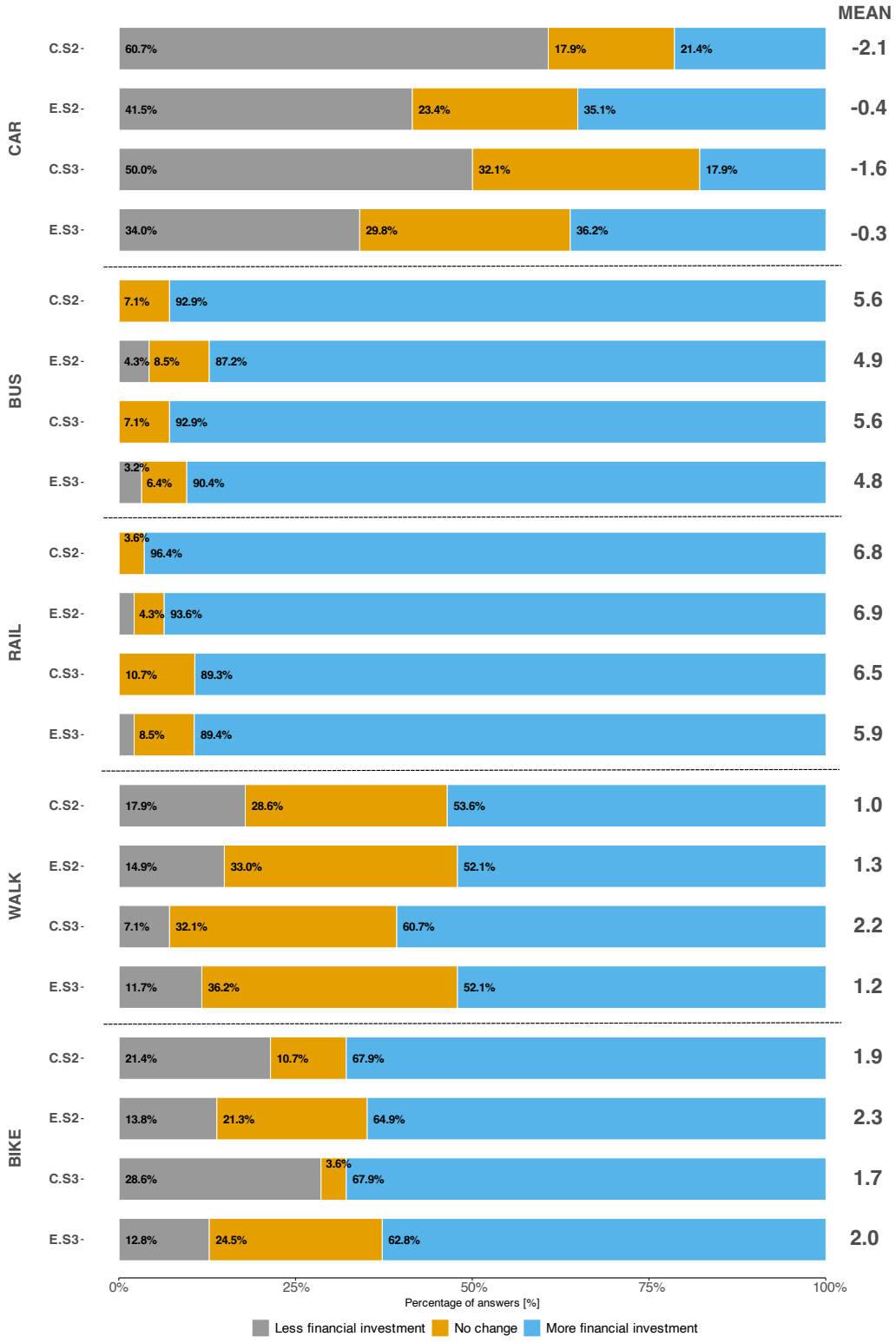


Figure 4.15 Evolution of financial investment for modes between surveys 2 and 3 for control and experimental groups

socio-demographic items had been removed. As a consequence, no baseline measurements are available for these attitudinal measures, making it impossible to assess whether the interventions produced an immediate effect between surveys one and two, or to account for pre-existing differences between groups on these dimensions.

Although examining the average scores does not allow us to draw statistically significant conclusions, a general trend nevertheless emerges from the responses given for cycling in the four figures. Indeed, for the second survey, we observe that the scores are consistently higher in the experimental group than in the control group. However, when comparing the responses of the same group between surveys 2 and 3, the scores for the control group remain either very similar or increase, while the scores for the experimental group decrease. This might suggest that the interventions had a short-term effect on the experimental groups, but that these effects wore off over time.

4.3 Discussion

Based on the results presented, I conclude that the interventions did not have a noticeable effect. In the responses to the second survey, conducted one month after the interventions, the vast majority of respondents indicated that they had not used BIXI, even though it was possible to obtain a free one-month subscription. Among those who had used it, either previously or for the first time, there was no observable difference between the control group and the experimental groups.

In the third survey, the results were similar. Only eight of the 122 respondents had used the BIXI winter service, and one to two people per experimental group had tried the summer service for the first time. In terms of intention to use BIXI for the 2025 summer season, the control group had the lowest percentage of people who responded 'Very unlikely' and the highest percentage of people who responded 'Very likely', which is contrary to what was expected had the interventions had any effect. This indicates that the interventions presented to the experimental groups did not impact their intentions to use the BIXI service.

In short, these results suggest that talking about the BIXI service, displaying the promotional code and explaining how to use it are not sufficient measures to influence mobility behaviours in the context of first-year students at Polytechnique Montréal. These actions have not succeeded in breaking down barriers and nudging the students to try a new behaviour. I believe that a more concrete measure, such as going to a BIXI station, unlocking a bicycle and riding around the block, could help to further break down the psychological barrier to using BIXI. Accompanying students in this way could should them how easy it is to use the

service, and that riding a bicycle could be great.

Regarding the evolution of stages of change, the results suggest that group membership, whether experimental 1, 2, 3 or control, was not associated with statistically significant differences in SOC progression for either the bicycle or the car, across either time interval examined (surveys 1 to 2, or surveys 1 to 3). This finding was further corroborated by multinomial logistic regression modelling comparing the first and third survey waves, which yielded almost no statistically significant results, reinforcing the conclusion that the interventions did not produce a detectable or lasting effect on participants' behavioural stages.

Similarly, the slider questions assessing attitudes toward various modes of transport (including car, bus, rail, walking, and cycling) across dimensions of support, infrastructure, allocated space, and financial investment, revealed no statistically significant differences between groups. This suggests that the interventions did not meaningfully shift participants' broader transportation-related attitudes. That said, one noteworthy pattern did emerge in the short term: bicycle-related scores were consistently higher in the experimental group than in the control group at the time of the second survey, hinting at a possible immediate effect of the interventions on cycling attitudes. However, this effect did not persist, as no such difference was observed in the third survey.

Taken together, these findings indicate that while the interventions may have produced a short term response, they were ultimately insufficient to generate sustained changes in either behavioural stage progression or attitudes toward cycling.

This study was designed in part to test the habit discontinuity hypothesis, which posits that behaviour change interventions are more effective when delivered during context changes in an individual's life. The theory posits that when habits are temporarily disrupted, people are more sensitive to new information and adopt a mindset more conducive to change (Verplanken et al., 2008; Aarts et al., 1997). Starting a new school year at a new institution was expected to represent such a window of opportunity. However, the results did not support this hypothesis in the present sample. A possible explanation is that the majority of students already relied on sustainable modes of transport, primarily public transit and walking, for most of their daily trips before arriving at Polytechnique. Therefore, they might not have felt the need to change their behaviour, as they were already making environmentally responsible travel choices, unlike car-dependent individuals.

Also, the interventions in this study were not tailored to participants' individual stages of change. All students received the same information, regardless of whether they were in the precontemplation, contemplation, or preparation stage with respect to cycling. However, evidence suggests that this one-size-fits-all approach is less effective than stage-matched delivery

(Keller et al., 2019; Gatersleben and Appleton, 2007; Friman et al., 2017).

4.4 Limitations

An important consideration for this study concerns the influence of seasonal variation on the stages of change classifications. The three surveys were distributed at distinctly different points in the cycling calendar: the first in September, when late-summer conditions were still highly favourable for cycling; the second in October, as the typical Montreal cycling season was drawing to a close; and the third in April-May, coinciding with the return of mild weather. This temporal distribution likely had a meaningful impact on how participants responded to SOC-related questions. The SOC maintenance phase for cycling is defined by the intention to continue or increase one's use of the bicycle in the coming months, a statement that carries very different implications depending on the time of year. For example, let's consider a student who cycled regularly throughout the summer and continued commuting by bicycle upon starting their semester at Polytechnique in the fall: they would reasonably be classified as being in the maintenance stage at the time in the first survey. However, as temperatures dropped, this same individual may have gradually shifted to public transit for the winter months, no longer intending to maintain or increase their cycling frequency. In the second survey, they would therefore not meet the criteria for the maintenance stage, and this shift would be recorded as a regression, even though their relationship with cycling has probably not fundamentally changed. By the third survey in spring, with snow gone and cycling once again viable, this person would likely reaffirm their intention to cycle regularly, and be reclassified into the maintenance stage. This seasonal dynamic introduces a significant ambiguity into the SOC framework as applied to cycling behaviour in this context: a person who is genuinely committed to cycling as their primary mode of active transportation may nonetheless cycle exclusively in warmer months, yet this seasonal interruption does not necessarily reflect a true behavioural regression. The SOC instrument, as currently used in this study, does not appear to account for seasonality. This may lead to an overestimation of both regressions and progressions between survey waves, ultimately complicating the interpretation of longitudinal trends in this study. One possible avenue to address this limitation in future work would be to add a follow-up question to the SOC instrument asking participants whether their response reflects their year-round behaviour or only their warm-season behaviour. This would allow for a clearer distinction between genuine stage changes and seasonal fluctuations without fundamentally redesigning the SOC instrument.

Another important consideration pertains to the composition of the control group, which was the only group to include Civil Engineering students. By the nature of their discipline, these

students regularly engage with topics such as urban planning, transportation, and environmental sustainability. As such, they may have entered the study with a pre-existing interest in sustainable mobility, or developed greater familiarity with these topics over the course of the academic year through their discipline-specific coursework. This could help explain why the control group exhibited outcomes more similar to the experimental groups than expected, including comparable rates of BIXI trial usage and similar attitude profiles in the slider questions. In other words, the control group may not have functioned as a true neutral baseline, as its members were likely already more attuned to the themes the interventions sought to promote. This compositional imbalance represents a potential confounding factor, and future studies would benefit from ensuring a more balanced distribution of disciplines across groups, or accounting for field of study in the analysis.

One of the main limitations of this study is the small number of respondents who completed all three surveys, which made it considerably more difficult to achieve statistically significant results and increases the risk of failing to detect real effects. As a result, the findings should be interpreted as exploratory, and a larger sample would be needed to draw more definitive conclusions. Several factors contributed to this low participation rate. First, participation was entirely voluntary, relying solely on students' goodwill and desire to support a fellow Polytechnique student. Second, longitudinal studies are inherently prone to attrition, as maintaining engagement across multiple time points is a well-documented challenge (de Leeuw, 2005). Finally, the limited resources available for this project made it impossible to offer financial incentives to all survey participants, which might otherwise have helped sustain participation across all three survey waves.

CHAPTER 5 FOCUS GROUPS

This next chapter discusses the focus groups conducted with the general population of the Greater Montreal Area. The objective of these focus groups is to determine how attitudes, approaches and deal breakers to cycling vary according to bicycle SOC in the general population of the Greater Montreal Area.

5.1 Methods

5.1.1 Recruitment and group organisation

In organising the focus groups, our intention was to recruit individuals from the general population of the Greater Montreal area that did not feel especially concerned about cycling, either in a positive or negative way. For this reason, intentional 'deceit' was used in the recruitment survey: the survey did not reveal that the focus groups would discuss cycling for transport. Indeed, I did not want to introduce any initial biases, either during recruitment or during the focus groups. Therefore, the survey only mentioned that the discussion would be about mobility in general and different transport modes. As cycling is generally a contentious issue, which proves to be true in Montreal, the purpose of this intentional deceit was to avoid recruiting participants on either extreme of the cycling scale (highly pro-cycling or highly anti-cycling) that might otherwise have been retained through the social media recruitment campaign. I opted for this strategy to ensure our groups would be more representative of the average Montrealer not necessarily involved in the cycling debate.

Focus groups participants were recruited through social media. More specifically, 81 neighbourhood groups on Facebook were joined, and the recruitment statements were posted in these groups. The purpose of the recruitment survey was to identify potential participants.

The initial Facebook post did not mention any financial compensation associated with participating in the groups. I did not want to recruit participants whose motivations were solely financial and who would not participate much in the discussions. However, this approach proved unsuccessful. Two weeks after the initial publications, along with a second 'reminder' type publication in the neighbourhood groups, an insufficient number of responses had been received. It was therefore necessary to change the strategy and state that participants would be offered $50 as well as transportation compensation. Once a sufficient number of potential participants had answered the survey, the focus groups were organized. To be eligible for the study, participants had to be aged 17-75, live in the Greater Montreal Area, and not have

any limitations (physical or other) preventing them from cycling.

Since the objective was to host groups according to bicycle SOC to detect differences in attitudes between stages, it was necessary to categorise participants. As SOC relates to both use and intention, these two concepts were divided into two questions in the recruitment survey: i) Typically, during the summer, how often do you use the following modes of transport to get to destinations?, and ii) Considering you current level of walking/car use/public transit/ cycling as a means to reach your destinations, which of these statements best describes your intention?. To maintain the neutral recruitment strategy, these two questions were asked related to walking, using the car, using public transit, as well as cycling. An example of the statements used to assess intention for walking is given below. The statements for car use, public transport, and cycling follow the same pattern. The full recruitment survey as well as the corresponding consent forms are included in Appendix F.

- I wish to walk less, I plan on doing so in the future.
- I wish to walk less, but I feel it is impossible.
- I am satisfied and will not change my situation.
- I wish to walk more, but I feel it is impossible.
- I wish to walk more, I will start doing so in the future.

The division of participants for the focus groups is shown in table 5.1. Three groups were identified: (1) non-cyclists, who do not cycle and are satisfied with this situation; (2) occasional cyclists, who cycle sometimes; and (3) convinced cyclists, who cycle frequently and are satisfied or would like to cycle even more. Each of these three groups were hosted in a distinct focus group.

5.1.2 Hosting the groups

For each focus group, the ideal number of participants was six to eight. However, it was not possible to recruit this number for every group, even though at least 15 people were contacted for each one. Challenges included potential participants not responding to invitations, limited availability during the summer, and some participants simply not showing up after having accepted an invitation to a session.

Two of the focus groups were hosted at Polytechnique Montréal, while one took place at Burnside Hall, on the McGill University campus. Following the discussion guide shown in

Table 5.1 Categorisation of participants based on SOC measures

Group	**Frequency of bike use**	**Intentions regarding bike use**	**SOC**	**Potential participants**	**Actual participants**
Group 1, non-cyclists	Never	Satisfied, will not change	Precontemplation	30	5
Group 2, occasional cyclists	Sometimes; less than once a week; 1–2 days a week	All intentions included	Contemplation; Preparation; Potential relapse	15	4
Group 3, convinced cyclists	3–4 days a week; 5+ days a week	Wish to use it more (feels impossible); Wish to use it more (will do so); Satisfied	Action; Maintenance	19	7

Table 5.2, I moderated all three groups, and was accompanied by fellow members of our research team for support and note-taking, either Owen Waygood, Jérôme Laviolette or Lexi Kinman. An audiovisual recording of the groups was taken to allow full transcription of participants' answers. The focus groups lasted approximately one hour and thirty minutes (1h30) each and took place in July and August 2025. At the end of each group, participants were given an e-gift card of $60 ($50 for participation and a $10 travel compensation) to thank them for their participation.

To develop the discussion guide, several resources were consulted beforehand, including examples of focus groups conducted in the field of transport and published in scientific articles. The structure of the guide was also informed by the theoretical frameworks mobilised in this research, namely the TTM and Ralph's deal breaker theory for cycling. Since identifying perceived deal breakers to cycling according to participants' cycling SOC was a primary objective of the study, the key question on deal breakers was intentionally positioned early among the central discussion topics. This question directly addressed the five categories proposed by Ralph, while allowing participants to freely elaborate on the conditions under which cycling would become unacceptable or unrealistic for them. Positioning this discussion after the introductory and transition questions also allowed participants to become more comfortable with one another before addressing more personal perceptions and attitudes.

In addition, we sought to better understand the type of information, planning process, and practical reasoning mobilised by individuals who do not necessarily cycle regularly when imagining a potential bicycle trip. For this reason, the scenario-based question was included. By asking participants to imagine a situation in which cycling became temporarily necessary, the discussion encouraged participants across different SOC to reflect concretely on how

they would organise such a trip, what information they would seek, and what barriers or uncertainties would emerge. The hypothetical nature of the scenario also helped reduce defensiveness among Non-cyclists by framing cycling as a temporary necessity rather than as a moral obligation or lifestyle choice.

At a broader level, the study also aimed to better understand why individuals support or oppose cycling beyond their own personal travel behaviour. Even if some individuals may never adopt cycling themselves, reducing resistance toward cycling infrastructure and policies can still represent an important societal gain. For this reason, the legitimacy question was included to encourage participants to reflect on the broader social role of cycling and the reasons society should, or should not, support it. This question appealed more directly to participants' rational and political reasoning. Furthermore, because cycling is often associated with widely recognized societal benefits, such as environmental sustainability and physical health, this question also provided insight into how participants reconciled these recognised benefits with their own attitudes or reluctance toward cycling.

Finally, since sufficient time remained within the planned duration of the focus groups, a final key question related to Moral Foundations Theory was added. Different arguments presented to participants, each anchored in one of the moral foundations, were intended to explore how various moral framings of cycling were perceived by participants at different SOC. This component was mainly designed to support the work of a colleague involved in the broader *ACCEPTER le vélo* research project, Lexi Kinman, whose master's research specifically focused on Moral Foundations Theory related to support for cycling (Kinman et al., 2025).

The time allocated to each question in the discussion guide served as a reference point. It was established to ensure that all questions could be discussed while allowing more time for the questions considered most important to the study (the key questions). Nevertheless, the time spent on each question varied slightly between groups depending on the number of participants and the extent of the discussion generated by each question. The group of convinced cyclists, which included seven participants, exceeded the planned duration by approximately five minutes.

An important detail worth mentioning regarding the discussion guide (see Table 5.2) is that participants were informed of the exact topic of the discussion after a few icebreaker and introductory questions. They were told that their group had been randomly chosen to discuss cycling as a mode of transport, even if they were not necessarily cyclists, and that other groups would discuss other modes. At that point, the deceit strategy was put to an end and participants were now fully informed that they would be discussing cycling.

Table 5.2 Semi-structured discussion guide for focus groups

Question type	**Purpose**	**Question**	**Timing (min)**
Opening	Open discussion space, get acquainted with other participants	1. Where did you leave from and how did you get to today's focus group?	3
Opening		2.A) What was your decision-making process for choosing your transportation mode today? B) Did you use a route calculation app (e.g., Google Maps) or search the Internet for information about parking? What factors did you consider (cost, weather, comfort)?	7
Statement	Reveal the topic of the focus group	Your group has been randomly selected to focus on cycling as a mode of transportation. Other groups will discuss other modes. You may not use a bicycle, it may not be a realistic mode of transportation for your trips, and that's okay. Maybe some of you don't have a very positive opinion of cyclists. Our goal is simply to discuss it.	1
Transition	Link toward key subject	3. Do any of you bike? When was the last time you rode a bike? In what context (transportation vs. leisure)?	5
Transition	Make biking relatable	4. Do you have any friends or family that bike?	5
Key – Scenario	Understand what people in different B-SOC need/are looking for when they HAVE TO do a trip by bicycle	5. Imagine that public transportation is on strike and your car, if you have one, is broken down or at the repair shop. You MUST therefore use a bike to get to your destination. How would you go about doing that? You can imagine it is an important appointment that you have to get to, and you have nothing to carry. Ex: a medical appointment at a CLSC	15
Key – Deal breaker	Test Ralph's dealbreaker theory	6. What is your dealbreaker in each of these categories? Safety, comfort, relative convenience, meeting your needs, social approval **Additional documentation to fill out distributed to participants*	25
Key – Legitimacy	Understand what is viewed as legitimate vs illegitimate for cycling	7. Maybe some of you don't bike to get around, but some people do to access their jobs and daily needs. Why should society support, or not support, cycling?	10
Key – MFT	Test different arguments supporting cycling from the Moral Foundations Theory	8. Have you ever heard this? Is it believable? How did it make you feel? *A 3 page document of previously developed statements is given to participants showing various arguments supporting cycling.*	15
Ending	Give participants a chance to share any remaining remarks	9. Do you have something else to share? Something you would want others to know?	5

5.1.3 Analysis

Many different approaches exist to analyse focus groups, such as content analysis, thematic analysis, grounded theory, and discourse analysis. The method is usually chosen depending on the study's objective. In this case, I choose to use thematic analysis, both inductive and deductive. Each of these two methods was used independently and exclusively, depending on the question being analysed. For the inductive method, the participants' answers guide the analysis and the themes identified directly emerge from their answers. This method is used for the trip planning question (see question #5 in Table 5.2). I used this method to reduce bias, as researchers are more informed on their research subject than people participating in the study.

On the other hand, when using the deductive method, themes are pre-determined and participants' answers are classified according to these pre-determined themes. Because I want to specifically test Ralph's deal breaker theory (2025), the themes examined are already defined: safety, comfort, relative convenience, social approval, and tool availability.

Prior to analysis, a full transcript of all interactions from participants was produced. Then, when necessary, participants' answers were reassigned to the appropriate question. In a focus group, it is not uncommon that in answering a question, a participant provides an answer to a subsequent question. Next, answers were coded: similar answers were grouped, and specific themes were assigned to each group of similar answers. The outcome of this process is presented in the results section below.

5.2 Results and discussion

Socio-demographic characteristics of participants in the three groups are presented in Table 5.3. Given the small number of participants per group, it is not possible to establish meaningful associations between cyclist group type and socio-demographic characteristics. As such, this table is intended only to provide an overview of the participants included in the groups.

Using the postcode provided in the recruitment survey, participants' Walk Scores were obtained (Walk Score, 2026) and are shown in Table 5.3. This measure was used because it provides an overview of the built environment, particularly the availability of nearby amenities (parks, grocery stores, schools, etc.). The aim was to assess whether there were significant differences in the built environment across the three cyclist groups. As shown in the table, the variations between the groups are not substantial.

Table 5.3 Participant socio-demographic characteristics by group

	Non-cyclists (n=5)	**Occasional cyclists (n=4)**	**Convinced cyclists (n=7)**
Age			
30–44	1 (20%)	2 (50%)	4 (57%)
45–59	2 (40%)	1 (25%)	2 (29%)
60–75	2 (40%)	1 (25%)	1 (14%)
Gender			
F	4 (80%)	3 (75%)	4 (57%)
M	1 (20%)	1 (25%)	3 (43%)
Income			
Low	1 (20%)	2 (50%)	2 (29%)
Med	0 (0%)	1 (25%)	1 (14%)
High	3 (60%)	1 (25%)	3 (43%)
Prefer not to answer	1 (20%)	0 (0%)	1 (14%)
Education			
Professional studies	0 (0%)	0 (0%)	1 (14%)
Undergraduate	2 (40%)	3 (75%)	2 (29%)
Graduate	3 (60%)	1 (25%)	4 (57%)
Walk score			
Min	48	51	75
Max	98	97	97
Average	82.4	84	87.7

5.2.1 Trip planning

This section focuses on the scenario question (see question #5 in Table 5.2). With this question, our goal was to determine how approaches to trip planning and the information sought prior to a trip by bicycle differed according to bicycle SOC. In this question, I asked participants to imagine that they had to get to an important appointment by bicycle. Their car, if they had one, was at the repair shop, and public transport was on strike. They could imagine that the appointment was a doctor's visit at a CLSC close to where they lived (distance of 3 kilometres approximately), and they had never been to that location before.

In the Non-cyclists group, two participants responded that they would not bike; they would be forced to cancel the appointment. Of these two participants, one indicated that they would end up walking to the destination. Once that person had mentioned wanting to walk, other participants stated similar answers. At that point, participants had to be reminded that the question focused on a trip that was *necessarily done by bike*. This shows to which point cycling, most of the time, is not even considered a viable option for non-cyclists. Safety

concerns, namely related to the appropriate age for bicycle riding, were also brought up in this group, with one participant stating:

> 'I don't have a helmet, I don't have knee pads, I don't have any of those things that I consider very important in terms of safety. Since I don't have them, I won't get on a bike.'

This answer reveals the high perception of danger related to cycling felt by the participant and the necessity of various protection equipment to render cycling feasible. Another concern mentioned by a participant in this group is that cycling is sometimes too 'troublesome': having to park your bicycle and not every destination having such spaces, as well as cycling being a 'hassle'. This relates to the issue of inadequate infrastructure. Bike theft also concerned participants from this group, with one participant mentioning that you have to hope your bike is still there when you come back out.

In the Ocassional cyclists group, safety concerns were also raised. However, the type of concern was different, as they were more oriented toward cycling paths sometimes being mislabelled online and lacking connectivity rather than needing protective equipment. More specifically, a participant said:

> 'Some [cycling paths] are indicated online, but are not super safe. It is a designated lane, and it ends in the middle of nowhere, on a big boulevard.'

Similar to the Non-cyclists group, bicycle theft was also mentioned by a participant in this group. Yet, they were not afraid of getting their bicycle itself stolen, but rather just the seat. For this reason, they always removed their seat and took it along with them when they locked their bicycle outside. Although theft was perceived as an inconvenience, it was not sufficient to dissuade this participant from cycling. In this group, existing knowledge of the cycle network came up several times. Thanks to their previous cycling experiences, participants knew how to navigate the network and which type of roads they preferred to take. Participants indicated that they would 'mostly rely on itineraries that [they are] already familiar with' and 'go by instinct'. Unlike the first group, participants from the occasional cyclists group did not have trouble answering this question. They understood its implications and were able to answer it in a timely fashion.

In the Convinced cyclists group the answers were almost immediate. Right after the question was asked, many participants pointed toward their phone and said 'Google Maps'. This shows that imagining a trip by bicycle, even if to a destination that was never visited before, is like an instinct, an automatic behaviour for people in this group. Similar to the group

of occasional cyclists, existing knowledge of the cycle network was often mentioned, with participants indicating that this made it easier for them to plan their trip. One person even said:

> 'I've been doing trips [by bicycle] for a long time, so I don't exactly listen to what [Google] Maps says. If I know there's not as much of a hill on that route, I'll take that street instead.'

Hence, knowing the network proves to be an asset to chose routes that are more appreciated by participants, which can contribute to improving the pleasure associated with cycling for transport. This quote also shows that participants can focus on different considerations when choosing a route, such as topography and safety.

Safety concerns proved to be a recurrent theme through all three groups. In the Convinced cyclists group, participants indicated trying to find the safest routes thanks to the Google Maps cycling path feature (where dark green shows separate bike lanes, and light green shows marked bike lanes). It was also mentioned by one person that a slightly longer itinerary with a higher proportion of bicycle lanes is preferred to a shorter alternative. Another participant brought a nuanced view on this subject: while they used to always seek the fastest routes, even if that meant cycling on big boulevards (such as Sherbrooke or Papineau), they recently changed to safer behaviour after their partner had been 'doored' (i.e., striking a cyclist by opening a car door, FR: *emportiéré*). This shows that being affected personally by a security incident, even if it does not happen to oneself, can influence future behaviour.

In all three groups, using navigation tools was mentioned, specifically Google Maps. However, use of these tools was different. For instance, the Convinced cyclists group knew about the safety classification of bicycle paths. Further, an aspect only mentioned in the Convinced cyclists groups was using the 'Street View' option offered by Google Maps to help find landmarks along the itinerary and avoid having to write down the itinerary or check it along the way.

Discussion

Based on the participants' answers shown above, we can conclude that SOC influences trip planning skills. Certain individuals in the precontemplation stage (Non-cyclists group) felt they would be forced to cancel their appointment: cycling was simply considered impossible. Participants in this SOC did not quite understand *why* it would ever be necessary to complete a trip by bicycle.

On the contrary, individuals in the action and maintenance stages for cycling (Convinced cyclists group) had no trouble planning their trip. They would only need to look up the itinerary with a navigation tool and set off on their bicycle. For these individuals, cycling was second nature.

For people in the contemplation, preparation, or potential relapse stages (Occasional cyclists group), imagining travelling to an appointment by bicycle and planning the trip was a reasonable task. Although safety concerns related to the lack of connectivity in cycling infrastructure emerged, these participants all judged it acceptable to cycle to the destination. They would nonetheless look up the itinerary using a navigation tool, and sometimes navigate according to their previous knowledge of the cycle path network. As participants in these SOC have previously cycled, they had a better understanding of which tools were available to them and how to use their experience as a cyclist, even if limited, to help them plan their trip. Going to an unknown destination did not force them to abandon the trip by bicycle. In fact, although these participants were not avid cyclists, they were less put off by the task they were asked to perform than those in the Non-cyclists group.

5.2.2 Perceived barriers (Deal breaker theory)

With this question, our goal was to determine if and how deal breakers differed with respect to the different bicycle SOC. I first explained to participants what a deal breaker for cycling was, i.e., a certain condition or a set of conditions for which they would absolutely not cycle. For example, thunderstorms might be a significant deal breaker for many.

To encourage an initial individual reflection, participants were given a sheet listing the five categories of deal breakers elaborated in the theory and were asked to write down their deal breaker(s). Participants first individually reflected on and noted their deal breakers for a given category, after which a group discussion on that category was conducted. The same sequence of individual reflection, note-taking, and discussion was then repeated for each of the five categories of deal breakers. As such, each deal breaker was discussed one at a time. The definitions and examples provided to participants for each deal breaker category are summarised in Table 5.4.

Deal breaker #1: safety

The first deal breaker relates to the safety of cycling conditions. To illustrate this specific deal breaker, the following examples were given to participants: presence of bicycle lanes and their connectivity, and type of traffic on the roads.

Table 5.4 Deal breakers and examples given to participants

Deal breaker	**Examples given to participants**
Safety	Related to cycling conditions. For example: the presence of bike lanes and their connectivity, the type of traffic on the roads.
Comfort	Related to the pleasure of cycling. For example: physical effort, uneven or potholed roads, poor weather conditions, navigation and route finding, threat of harassment.
Relative convenience	Compared to other modes of transport. For example: comparison of time and money costs, inconveniences/constraints, and flexibility.
Social approval	For example: having people around you who cycle versus being the only person who does.
Availability of tools	Whether cycling can meet your specific needs. For example: access to a cargo or folding bike, access to secure parking, knowledge of bike maintenance and repair.

Participants from the Non-cyclists group mentioned concerns with sharing the road and were much more fearful of interactions with other road users, especially regarding collisions. One participant even questioned just how safe bicycle lanes really are.

> 'Even when there are bike lanes, there are people who don't stop, like cars. You can hit a car or other bikers who are not paying attention could also hit you. So how safe are those lanes, really?'

Some participants in this group felt like they would feel better and safer riding their bicycle if there were a lot of other cyclists on the road with them. This relates to the concept of safety in numbers, which stipulates that as the number of cyclists increases, the numbers of collisions involving cyclists increases at a lesser rate (Elvik and Bjørnskau, 2017). Therefore, an individual cyclist is less at risk when there are more cyclists on the road (Fyhri et al., 2017).

Boulevards with high amounts of traffic, high speeds and many car lanes in each direction is a safety deal breaker that was recurrent in all three groups. However, in the Occasional cyclists and Convinced cyclists groups, if a bicycle path was present on said boulevard, users would cycle along that route. Participants did not mention though the type of bicycle infrastructure necessary for them to accept these safety conditions. A painted line on the road does not offer the same safety, whether perceived or objective, as a bicycle lane fully separated from motorised traffic.

As for cycling lanes, needs differed across the groups. For the Non-cyclists group, bicycle

paths were judged as being a necessary requirement to cycle, no matter the traffic conditions. The group of Occasional cyclists, on the other hand, only judged these cycle paths as necessary when cars move at speeds of 50 or 60 kilometres per hour. A participant in the Occasional cyclists group also identified a deal breaker related to the type of bicycle path and the number of users. They explained that they would refuse to bike if the only available itinerary involved older, narrow two-way cycling lanes during peak rush hour (such as the path on Rachel Street in Montreal). The participant justified this by noting that these types of paths are associated with a higher risk of collisions but are sometimes the only major east–west cycling routes in certain areas.

Finally, the last safety deal breaker mentioned by the Occasional and Convinced cyclists groups was carrying children. It was not mentioned if participants distinguished carrying a child onboard their own bicycle, or more largely, cycling with children that ride on their own bicycle or are being pulled along in a child bicycle trailer. No participants in the Non-cyclists group mentioned this and that might be explained because either a) these participants did not have any young children that they might cycle with, or b) as they do not actually cycle, they cannot even imagine bringing a child along with them, so this was not mentioned as a deal breaker.

Deal breaker #2: comfort

The second deal breaker is about the comfort related to the pleasure of cycling. To illustrate this specific deal breaker, the following examples were given to participants: physical effort, uneven or potholed roads, and poor weather conditions.

For this category of needs, a greater number of items were mentioned by the Non-cyclists group. For starters, this is the only group that highlighted that the bike seat was uncomfortable and that this alone could be a deal breaker. Deal breakers were also mentioned regarding clothing: cycling whilst wearing a skirt or a dress was seen as being impossible. A participant in this group also mentioned that the clothes required for cycling are not the same clothes as those worn on a daily basis. Since acquiring these specific clothes results in additional monetary costs, that would be a deal breaker.

This suggests that participants in the Non-cyclists group perceive cycling as uncomfortable, restrictive, and dependent on specialised equipment, particularly clothing. In contrast, in contexts where cycling is normalised and part of everyday mobility practices, individuals typically ride in regular clothing and do not view cycling as a performance-oriented activity (cycling is not a ‘race’). Rather than ‘preparing’ to cycle, they simply use it as a practical means of reaching their destination. The perceptions expressed by Non-cyclists therefore

reflect a view of cycling as requiring additional effort, planning, and specialised clothing, which may contribute to it being dismissed as a viable transport option.

Each participant in all three groups highlighted weather-related deal breakers, underscoring how the Quebec climate poses challenges for everyone. However, tolerance levels varied by group. Non-cyclists reported that any rain or snow would prevent them from cycling. Occasional cyclists were more tolerant, but still identified extreme conditions, such as heavy rain, thunderstorms, heatwaves, or accumulated snow, as deal breakers. Only Convinced cyclists reported continuing to ride during the winter, although inadequate snow removal on roads remained a limiting factor.

One participant from the group of Convinced cyclists also mentioned that overly complicated routing could also be a deal breaker, i.e., routes involving too many turns onto side streets rather than following major arterial roads (such as Christophe-Colomb or Bellechasse).

This suggests that even for Convinced cyclists, navigation can act as a barrier when routes are perceived as overly complex or indirect. It highlights the importance of developing cycling networks that do not rely solely on small, low-traffic streets, but that also provide direct and legible connections along major routes with meaningful destinations. Hence, regular cyclists do not accept just any cycling conditions: they also require high-quality infrastructure that ensures efficient and continuous travel along key urban corridors.

Deal breaker #3: relative convenience

The third deal breaker examines the relative convenience of cycling compared to other modes of transport. To illustrate this, participants were presented with examples such as comparisons of time and monetary costs, as well as considerations related to inconveniences, constraints, and flexibility.

Travel time was frequently identified as a deal breaker. For participants in the Non-cyclists group, the issue was primarily related to uncertainty. They found it difficult to estimate cycling travel time unless they had previously completed that specific route. In contrast, participants in the Convinced cyclists group emphasized that cycling becomes unfeasible when travel time is too long and a strict schedule must be respected, such as for a show or a medical appointment. Needs related to travel time were not mentioned by any participants in the Occasional cyclists group.

Distance also emerged as an important factor, though thresholds revealed different perspectives across groups. Non-cyclists indicated that cycling was not worthwhile for short trips, thereby suggesting a lower limit. One participant noted:

> 'At this point, for 2-3 kilometres, it is not worth my time or my effort to be biking.'

By emphasizing the effort associated with cycling, this statement may reflect the previously identified perception that cycling requires preparation and specialised clothing, which in turn increases the perceived cost of even short trips.

In contrast, Occasional cyclists offered a more conventional perspective by identifying an upper limit, with distances beyond 15–20 km generally considered impractical.

A participant from the Non-cyclists group also identified a deal breaker related to the hassle of cycling:

> 'If you are with other people and you need to coordinate because you are going by bike and they are going by metro/taxi/whatever, it's an annoying extra step.'

This quote shows that the participant perceives cycling as inconvenient and insufficiently flexible when travelling in group settings. Because different people may use different modes of transport, cycling requires extra coordination, which feels like an added hassle.

Finally, the need to transport cargo was mentioned by participants in all groups as a potential deal breaker. However, participants in the Occasional and Convinced cyclists groups referred to specific solutions, such as bike trailers that can be offered by services like BIXI or Locomotion. This suggests a greater awareness of available tools that can help accommodate these needs.

An interesting point emerged from the discussion with Non-cyclists regarding the perceived cost of transport. For one participant, public transit was associated with a sense of 'free' mobility once a monthly pass is purchased. On the other hand, cycling, particularly through services such as BIXI, was perceived as involving a cost for each use. As this participant explained:

> 'For Bixi, you have to pay per hour. I never tried Bixi, but with the opus card per month, you get free anything. I take zones AB, it includes tram, metro, buses.'

This highlights that how costs are perceived might influence transport choices: even though public transit requires an upfront payment, it is perceived as costless at the point of use, while cycling is seen as generating incremental expenses. It is also noteworthy that this perception does not fully align with the actual pricing structure, as BIXI offers monthly and seasonal subscriptions that could similarly create a 'pay once, use freely' experience. This

provides a clear illustration of Ralph's argument that it is individuals' *perceptions* of prevailing conditions, rather than *objective* conditions themselves, that shape what constitutes a deal breaker.

Deal breaker #4: social approval

To illustrate this specific category of needs, the following example was given to participants: having people around you who cycle versus being the only person who does.

In all groups, no needs related to social approval were identified as deal breakers. A participant from the Convinced cyclists group mentioned that they hardly knew anyone who cycled, but this did not influence their own decision to cycle. This suggests that a lack of social support or peer behaviour was not a limiting factor for them.

In the Non-cyclist group, one participant expressed a negative perception of cyclists who ride on sidewalks and do not ring their bell to warn others when passing. However, this perception was not framed as a deal breaker per se, as it was not presented as something that would prevent them from cycling themselves.

This category of deal breaker may also be more difficult to capture through self-reported responses. While participants across all groups did not explicitly identify social approval as influencing their behaviour, this does not necessarily imply that it plays no role. Individuals often perceive their decisions as independent from social influence, even though social norms are known to shape behaviours. As such, the absence of explicitly stated social approval needs may reflect a limitation of the method, rather than the true absence of this factor in influencing cycling behaviour.

Deal breaker #5: availability of tools

The fifth and last deal breaker relates to having access to the appropriate tools so that cycling can meet your specific needs. To illustrate this specific deal breaker, the following examples were given to participants: access to a cargo or folding bike, access to secure parking, and knowledge of bike maintenance and repair.

Concerns related to bicycle maintenance were mentioned in two of the groups. For the Non-cyclists, bicycle upkeep was viewed as being expensive, complicated, and time consuming, with one participant stating that it is just 'not worth my time, for me at least'. Another participant in this group talked about bicycle repair co-ops (co-operatives) to help with maintenance. They did not however have a very positive opinion of such initiatives:

> 'My husband tried it and got so annoyed by having to make an appointment and then "oh you're gonna learn this little bit". [It is] not the most useful means to maintain your bike. It's faster to have a business where you can say: my chain is broken, instead of having to try to DIY all the time. DIY is helpful and useful, but sometimes you just don't want to do it and can pay for the service.'

These perceptions suggest that maintenance is not only seen as burdensome, but also as requiring a level of knowledge and involvement that may deter potential cyclists. This expectation contrasts with other modes of transport, such as driving, where users are not expected to possess mechanical skills, and bringing your vehicle to a repair shop is considered normal. The implicit norm that cyclists should be able to maintain or repair their own bicycle may therefore constitute an additional social barrier. The fear of feeling judged by bicycle mechanics or being lectured about equipment can further reinforce barriers to cycling.

In the Occasional cyclists group, concerns about bicycle maintenance mainly related to having enough money to pay for a tune-up at the beginning of the season. There was also some uncertainty about whether this expense was worthwhile, meaning whether the bicycle would be used enough to justify the cost of maintenance.

Occasional cyclists and Convinced cyclists mentioned needs related to bicycle parking. For one participant in the Occasional cyclists group, a specific type of bicycle parking rack was required: newer circular hoop-style racks. Older racks, which only allow the front wheel to be locked, were seen as inadequate. For this person, the need for secure parking was very high. If suitable parking was not available at the destination, or if it required walking some distance from the final destination, the participant said they would choose not to cycle that route again in the future. Participants in the Occasional cyclists group also mentioned a time-related concern for parking. When leaving their bicycle in a less secure location, they were only comfortable doing so for up to two hours. Beyond that, one participant would avoid cycling there altogether, while another would choose to use BIXI instead.

In the group of committed cyclists, one participant explained that they checked in advance, using Google Street View, whether bicycle racks fixed to the pavement were available at their destination. If none were available, they would decide not to cycle there.

Finally, needs related to access were discussed in both the Non-cyclists and Convinced cyclist groups. A participant in the Non-cyclists group mentioned that she might be more motivated to cycle if she had access to a three-wheel bicycle.

> 'One reason I might attempt to use a bike is if I had a three wheel bike with a shopping basket. [It] would feel more stable. Pot holes and opening car doors

may not be such a big threat when you feel more stable.'

In the Convinced cyclists group, access was instead related to BIXI. One participant indicated that, for them to consider using BIXI, a station needed to be located within a reasonable distance—approximately a few hundred meters—from both the origin and the destination of their trip.

Discussion

Consistent with most literature, safety emerged as a key barrier across all stages of change (Pearson et al., 2023). Boulevards with high traffic volumes were perceived as problematic by participants in every group. However, an important distinction lies in how this barrier is interpreted across stages. For individuals in the precontemplation stage (Non-cyclists), such conditions were considered a clear deal breaker. In contrast, participants in higher stages (Occasional and Convinced cyclists) viewed these conditions as acceptable when adequate cycling infrastructure, such as a cycle path, was present. This suggests that progression along the stages of change may be associated with a greater ability to identify mitigating conditions related to potential barriers.

These finding contrasts with Naseri et al. (2026), who report that individuals in the precontemplation stage do not identify traffic safety as a barrier. However, Naseri et al. argue that as these individuals do not consider cycling as an option at all, they do not think about the dangers cycling might entail. Naseri et al. (2026) found traffic safety to be a clear deal breaker for contemplators, individuals who are not opposed to cycling in principle, but for whom traffic danger makes it seem impossible. The discrepancy in the findings may stem from differences in sample size: with a much larger sample (N=1055), Naseri et al. were able to distinguish between individuals who do not consider cycling at all (and therefore do not reflect on its dangers) and those who might consider cycling (but perceive it as impossible due to safety concerns). In the present study, these two profiles might have been merged within the same group.

Although concerns related to personal safety (e.g., intimidating behaviours or negative interactions with car drivers) were previously identified in the literature as barriers to cycling (Useche et al., 2019; Bhandal and Noonan, 2022; Piatkowski and Bopp, 2021), no such concerns were raised by participants in this study. This absence may suggest that participants primarily frame safety in terms of infrastructure and traffic conditions rather than interpersonal interactions, or that such concerns are less salient in the Montreal context.

More broadly, the results support the idea that individuals in the precontemplation stage

perceive a greater number and diversity of barriers, consistent with Nkurunziza et al. (2012). They also expressed needs across nearly all categories of Ralph's deal breaker framework. In terms of safety, the presence of cycling infrastructure was seen as a necessary condition to consider cycling. Regarding comfort, poor weather (rain, cold, and heat) was identified as a deal breaker, a finding aligned with Piatkowski and Bopp (2021), who similarly observed that weather is primarily a deterrent for non-cyclists. Participants in higher stages appeared more tolerant of such conditions. Precontemplators also associated cycling with preparation requirements, including special clothing, which further contributed to its perception as inconvenient.

Deal breakers related to the relative convenience of cycling also emerged among participants in the precontemplation stage. These included uncertainty about travel time for trips by bicycle, the difficulties of coordinating with others when travelling by different modes, and difficulties related to carrying goods. Additionally, issues related to the availability of tools emerged, particularly regarding bicycle maintenance. Participants described maintenance as costly, time-consuming, and requiring specialized knowledge. Notably, discussions revealed a perception that cyclists are expected to possess mechanical skills, an expectation not associated with other modes of transport, such as the car.

An important methodological consideration relates to the ability of precontemplators to identify deal breakers. Because these individuals do not regularly engage in cycling, they have limited direct experience with cycling conditions. As a result, certain barriers, such as network connectivity, may remain outside their awareness and therefore cannot be identified as deal breakers. Despite this, participants in the precontemplation stage were able to articulate a wide range of perceived barriers when prompted, suggesting that perceptions play a central role in shaping their evaluation of cycling. In some cases, these perceptions did not align with objective conditions in Montreal. For example, a participant believed that BIXI operates solely on a pay-per-use basis, despite the availability of subscription options. This supports Ralph's argument that individuals do not systematically compare their needs with prevailing conditions, even as these conditions evolve (e.g., expansion of cycling infrastructure and BIXI services). Consequently, interventions that encourage individuals to reassess current conditions in light of their needs may help reduce perceived barriers and facilitate progression along the stages of change.

Finally, the findings did not provide evidence supporting the deal breaker category related to social approval proposed by Ralph, as no participants explicitly identified needs in this domain. However, this absence should be interpreted with caution. It may reflect limitations in the data collection method rather than the true absence of social influences. Given that

social norms, stigma, and peer behaviours are known to influence human behaviour, it is likely that social approval operates in more implicit ways that were not captured in the focus group discussions.

5.3 Limitations

This study has several limitations. First, the small number of participants in each group limits the extent to which findings can be generalised. Although more individuals were initially recruited, scheduling conflicts, cancellations, and no-shows reduced the final sample size. Additionally, the study design originally included two rounds of focus groups (i.e., conducting each of the three groups twice). However, due to time and financial constraints, this was not feasible. Conducting two rounds of focus groups would have allowed for comparisons within the same categories, which could have helped determine whether important differences existed among individuals at the same stage of change. Further, it would also have been interesting to assess if conducting a second round may have helped achieve data saturation, that is, the point at which no new insights emerge from additional discussions.

Furthermore, although the study focused on the Greater Montreal area, I did not succeed in recruiting participants from suburban parts of this region. Attempts were made to engage these populations through Facebook neighbourhood groups, but these efforts were unsuccessful. This may suggest a lower level of interest or engagement with the study topic among these populations. Previous research indicates that individuals living in suburban areas, particularly those with longer commuting distances, may be less engaged in civic and community-related activities (Miller, 2018), which could help explain these recruitment challenges. Gathering insights on barriers to cycling from individuals living off the island of Montreal would have been particularly valuable, as their experiences may differ significantly from those of participants in more central urban areas.

To better reach these populations in future research, recruitment strategies could be diversified beyond Facebook neighbourhood groups. For example, invitations to participate could be shared through municipal newsletters or displayed in local libraries and community centres located in suburban municipalities. In addition, the geographic barrier to participation could be reduced either by holding focus groups directly on the South Shore or North Shore, or by offering online focus groups. Such approaches may facilitate participation among suburban residents and help obtain perspectives that are more representative of the diversity of mobility contexts present across the Greater Montreal area.

CHAPTER 6 CONCLUSION

6.1 Summary of works and overall discussion

This thesis presented two complementary studies examining travel behaviour, with a focus on cycling for transport among the Montreal population. The first study drew on the habit discontinuity hypothesis to design and test a behaviour change intervention targeting first-year students at Polytechnique Montréal, a population in a period of contextual disruption conducive to reconsideration of behaviours. Three distinct information packages were delivered through in-class interventions, covering the negative impacts of car use, as well as the benefits of cycling and practical guidance for getting started. Despite this theoretically grounded approach, the interventions produced no meaningful or lasting effect on BIXI use, cycling stage of change, or attitudes toward cycling. The second study took a different angle, using focus groups to examine how barriers to cycling manifest across different stages of change and how they relate to the deal breaker theory developed by Ralph (2025). This framework posits that as soon as a single cycling need goes unmet, an individual will not cycle, regardless of how well all other needs are satisfied. The study confirmed that individuals at lower stages of change report more barriers than active cyclists, while also revealing that even committed cyclists possess specific needs. Taken together, these two studies contribute to a growing understanding of what it takes to encourage cycling uptake.

Prior to this first study conducted among the first-year student population, the literature had established several relevant foundations. Research on the habit discontinuity hypothesis has demonstrated that individuals are more likely to reconsider their behaviour when a significant context change disrupts their existing routines, creating a window of opportunity during which interventions are more likely to be effective (Verplanken et al., 2008). Information campaigns delivered at these moments of disruption were identified as a potentially valuable tool to accompany and guide the change process. Furthermore, it was well established that behaviour change does not occur instantly, but rather unfolds as a gradual process through which individuals progress across qualitatively distinct stages, as described by both the Transtheoretical Model and the Stage Model of Self-Regulated Behaviour Change (Prochaska and DiClemente, 1983; Bamberg, 2013b). Against this backdrop, the start of a new academic year at a new institution appeared to represent an ideal context in which to test a behaviour change intervention aiming to increase cycling among first-year engineering students.

However, the results of this study did not confirm that expectation. The three information

packages delivered through in-class interventions, covering the negative impacts of car use, as well as the benefits of cycling and practical tips for getting started, produced no noticeable effect across any of the outcomes measured. Specifically, no significant differences were observed between the experimental and control groups with respect to BIXI use or intention to use the service, progression through the stages of change for cycling, or attitudes toward cycling in terms of financial investment, infrastructure, urban space, or general support. A modest short-term increase in support for cycling was observed in the experimental groups immediately following the intervention, but this effect had fully dissipated by the time of the third survey, administered eight months later. Taken together, these results suggest that the interventions, as designed, were insufficient to produce meaningful or lasting changes in students' mobility behaviours or attitudes.

Reflecting on these findings in the context of the broader literature raises several important questions about what might have been done differently. First, the interventions were not tailored to participants' individual stages of change. All students received the same content regardless of where they stood in their readiness to cycle. A stage-tailored approach might have been considerably more effective: the presentation on the negative impacts of car use would have been directed specifically at precontemplators, with the aim of raising awareness about car dependency as a problem behaviour. The presentation on cycling benefits and practical advice would have targeted individuals in the contemplation and preparation stages, who are already open to the idea of cycling but have not yet started doing so. That said, implementing such an approach would require a substantial methodological redesign, including an initial SOC assessment to assign participants to groups, and a logistically complex system for delivering stage-specific content to students from different engineering programs simultaneously. Second, the particular geography of Polytechnique Montréal deserves consideration. The campus sits atop a notably steep hill, and topography is a well-documented barrier to cycling uptake. No amount of informational content can easily overcome challenges related to topography, and that alone may have independently suppressed participants' motivation to cycle regardless of the intervention. Finally, it is possible that the study's eight-month observation window was simply too short to capture the full effects of the interventions. Behaviour change, particularly the kind that involves overcoming entrenched habits and practical barriers, can unfold over longer timescales. The interventions may have planted a seed: initiating a gradual reflection process that had not yet translated into observable behavioural or attitudinal change within the study period. Tracking the same cohort annually throughout their university studies, with surveys administered at consistent time points each year, would yield far richer longitudinal data and could reveal whether SOC progression and cycling uptake emerge over a longer horizon.

As for the second study, carried out through focus groups, a substantial body of literature had previously documented the many barriers that discourage people from cycling, including traffic safety concerns, insufficient cycling infrastructure, poor weather conditions, and a range of personal and social factors (Useche et al., 2019; Heinen et al., 2010; Bhandal and Noonan, 2022; Piatkowski and Bopp, 2021). Research had also established that these barriers are not perceived uniformly across the population, but vary according to individuals' stage of change with respect to cycling (Van Bekkum et al., 2011; Zarabi et al., 2025; Naseri et al., 2026). What remained less well understood, however, was the notion of thresholds, that is, the point at which a barrier becomes severe enough to prevent someone from cycling altogether. For any given set of conditions, two individuals may arrive at different decisions, with one choosing to cycle despite imperfect conditions while the other does not. This variability points to the existence of personal tipping points that standard approaches struggle to capture. The deal breaker framework proposed by Ralph (2025) offered a useful theoretical lens for this problem, framing cycling needs as strict thresholds rather than continuous variables: any single unmet need, regardless of how well other conditions are satisfied, is sufficient to prevent cycling entirely, much like a deal breaker in any other decision-making context.

The findings of this study both confirmed and extended the existing literature. As expected, individuals in lower stages of change perceived more barriers than those in higher stages, and expressed a greater number of unmet needs. Notably, participants in precontemplation stage tended not to perceive cycling as a normal, everyday activity: it was associated with additional preparation and requiring specialised clothing. This perception of cycling as effortful and exceptional, rather than ordinary and accessible, represents a meaningful psychological barrier that goes beyond infrastructure alone. At the same time, the study revealed that even committed cyclists, i.e., those in the action and maintenance stages, are not barrier-free. Convinced cyclists expressed clear and explicit needs, particularly with respect to the quality, quantity, and connectivity of cycling infrastructure. The results suggest that to both retain current cyclists and broaden cycling's appeal to a larger share of the population, continued investment is needed in making cycling accessible through services such as BIXI, fast through an extensive network of cycle paths connecting key destinations along major urban corridors, and safe through protected and ideally fully separated infrastructure

6.2 Limitations

A first limitation concerns the use of the Stages of Change framework as applied in both studies. As flagged by Bamberg (2013b), SOC classifications rely on stated intentions rather than observed behaviour. The fact that a person reports intending to reduce their car use

or increase their cycling in the coming months does not guarantee that they will actually do so. This gap between intention and behaviour is a well-known challenge in the travel behaviour literature, and future research would benefit from complementing SOC assessments with longitudinal measures of actual behaviour, which would allow for a more meaningful comparison between what individuals intend and what they ultimately do.

Closely related to this is the self-reported nature of the data collected in both studies. As noted by Keller et al. (2019), self-reporting can lead to incorrect stage assignment, as individuals may overestimate or underestimate both their current behaviours and their future intentions. While this limitation is inherent to survey-based research of this kind and does not lend itself to an easy methodological fix, it is important to acknowledge that some degree of misclassification may have affected the results of both the quantitative and qualitative components of this work.

Finally, a geographical limitation related to the student population study deserves mention. Gatersleben and Appleton (2007) note that stage-based models of behaviour change rest on the assumption that the behaviour in question is actually within the individual's capacity to perform. In their study, this meant that if a participant lived outside of a 5 mile (roughly 8 km) radius of the university, they assumed it was not feasible for them to cycle, so they were excluded from the study. In the present research, no such geographic filter was applied: it was assumed that all students could reasonably try BIXI, without accounting for where they lived. A student residing in a distant suburb such as Saint-Hubert, for instance, would face significant practical constraints that render regular BIXI use genuinely unfeasible, regardless of their attitudes or intentions. While such a student might occasionally use BIXI when they were already in Montreal for classes, they do not have the same cycling opportunities as students living in central Montreal.

6.3 Future Research

Several avenues for future research emerge from this work. A first and relatively straightforward direction would be to replicate the intervention study with different student populations. The present research was conducted exclusively with engineering students at Polytechnique Montréal, a campus with specific characteristics that may have influenced the results in ways that limit generalisability: its proximity to a Metro station, its hilltop location, and its distance from the Downtown core. It would be valuable to test the same approach with engineering students at McGill, Concordia, or ETS (École de technologie supérieure), and even more interesting to conduct a campus-wide study spanning multiple faculties and disciplines. Replication would also be particularly worthwhile at institutions where students rely

more heavily on cars as their primary mode of transport, as such contexts could provide a stronger test of the intervention's capacity to shift behaviour. Given that the intervention is relatively low-cost and logistically straightforward to implement, replication across different institutional contexts would be a logical and accessible next step.

A second promising direction would be to extend the observation window considerably. The eight-month study period may simply not have been sufficient to detect meaningful changes in mobility behaviour or attitudes. If the interventions succeeded in initiating a gradual reflection process (planting a seed, so to speak), the effects may only become visible over the course of a full degree program. Following the same cohort annually throughout their three or four years of study, with surveys administered at consistent time points each year, would yield far richer longitudinal data and allow researchers to determine whether SOC progression and behavioural change emerge over a longer horizon.

A third avenue worth exploring is the transition from university to the workforce. Students graduating and entering their first job represents another significant context change, one that may be even more consequential for long-term mobility habits than starting university. As new graduates begin earning a salary, the financial barrier to car ownership diminishes considerably, and their new workplace may be less well-served by public transit than their campus was. Research by Fujii (2007) has shown that providing information about the negative effects of car use to young non-drivers can reduce licence acquisition rates and, at a larger scale, lifetime CO2 emissions. This suggests that accompanying students at the point of graduation could be a particularly effective intervention strategy. Targeting this transitional moment with tailored information could help consolidate sustainable mobility habits before car use becomes a regular behaviour.

Finally, for the focus group study, several improvements could strengthen the findings. Conducting separate focus groups composed exclusively of participants at the same stage of change would allow for richer, more homogeneous discussions within each group and sharper comparisons across stages. Expanding the geographic scope of the focus groups would also be valuable. The present study drew primarily from central Montreal neighbourhoods, but the barriers and needs of individuals living on the North or South Shore, where cycling infrastructure is sparser and distances are greater, are likely to differ substantially. Understanding what it would take for residents of more car-dependent suburban environments to consider cycling for transport represents an important research question. Conducting some focus groups online could help remove the practical barrier of travel and facilitate the recruitment of participants from a wider range of locations, including those living further from the city centre. It could also reduce other participation barriers such as transportation costs and

childcare constraints that may prevent certain individuals from attending in-person sessions. However, this format comes with trade-offs worth considering. Online groups may reduce individual engagement and weaken group cohesion, limiting the spontaneous back-and-forth between participants that is often one of the most valuable features of in-person focus groups. A further concern is participant authenticity: online settings can make it more difficult to ensure that participants are genuinely engaged, as some may disable their camera, contribute little to the discussion, or live outside the target area. Online groups may also exclude certain populations due to technological barriers or limited digital literacy. As such, a hybrid approach that combines in-person groups for core urban participants with online sessions for those in more distant or underserved areas may offer the best balance between reach and discussion quality.

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APPENDIX A SOC CLASSIFICATION STATEMENTS FOR EACH MODE

Table A.1 Stages of change for different transport modes

Mode	**Stage of change**	**Statement(s)**
Car	Precontemplation	I mainly use the car, I am satisfied and see no reason to reduce my car use.
	Contemplation	I mainly use the car, I would like to reduce my car use but I feel it is impossible.
	Preparation 1	I mainly use the car, I am considering reducing my car use, but I am unsure how or when to do so.
	Preparation 2	I sometimes use other modes of transport, but I still mainly use the car. My goal is to reduce my current car use. I know which trips to replace and which mode of transport to use, but I haven't started doing so regularly yet.
	Action/Potential relapse	I don't drive or don't have access to a car, I plan to use a car in the future.
	Maintenance	I don't drive or don't have access to a car, I plan to maintain this situation in the future. & I do not use the car very often. I try to use other modes of transport as much as possible. I will maintain or reduce my car use in the upcoming months.
Bicycle	Precontemplation	I rarely or never do trips by bike, I am satisfied and see no reason to change this situation.
	Contemplation	I rarely or never do trips by bike, I would like to do more, but I feel it is impossible.
	Preparation 1	I rarely or never do trips by bike, I would like to do more, but I don't know how nor when to do so.
	Preparation 2	I rarely or never do trips by bike. My goal is to start to do more soon. I know which trips to replace, which route to take, but I haven't started doing it regularly yet.
	Action/Potential relapse	I often do trips by bike, but I am not sure I will continue to do so in the future.
	Maintenance	I often do trips by bike, I will maintain or increase the number of trips I do by bike in the upcoming months.

Table A.1 Stages of Change for Different Transport Modes (continued)

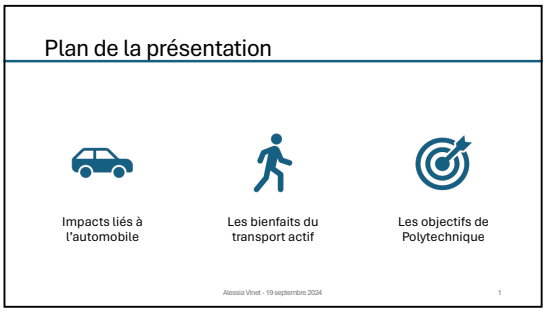
Mode	**Stage of change**	**Statement(s)**
Public transit	Precontemplation	I rarely or never do trips by public transport, I am satisfied and see no reason to change this situation.
	Contemplation	I rarely or never do trips by public transport, I would like to do more, but I feel it is impossible.
	Preparation 1	I rarely or never do trips by public transport, I would like to do more, but I don't know how nor when to do so.
	Preparation 2	I rarely or never do trips by public transport. My goal is to start to do more soon. I know which trips to replace, which route to take, but I haven't started doing it regularly yet.
	Action/Potential relapse	I often do trips by public transport, but I am not sure I will continue to do so in the future.
	Maintenance	I often do trips by public transport, I will maintain or increase the number of trips I do by public transport in the upcoming months.
Walking	Precontemplation	I rarely or never travel on foot, I am satisfied and see no reason to change this situation.
	Contemplation	I rarely or never travel on foot, I would like to walk more, but I feel it is impossible.
	Preparation 1	I rarely or never travel on foot, I would like to walk more, but I'm not sure how to incorporate it into my daily life.
	Preparation 2	I rarely or never travel on foot. My goal is to start to walk more soon. I know which trips to replace, which route to take, but I haven't started doing it regularly yet.
	Action/Potential relapse	I often travel on foot, but I am not sure I will continue to do so in the future.
	Maintenance	I often travel on foot, I will maintain or increase the number of trips I do on foot in the upcoming months.

APPENDIX B STUDENT INTERVENTION IN-CLASS CONTENT

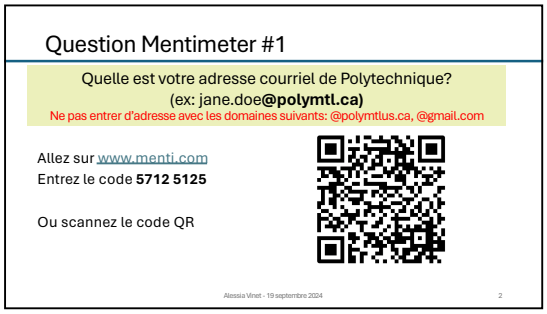
Intervention 1 (E1)



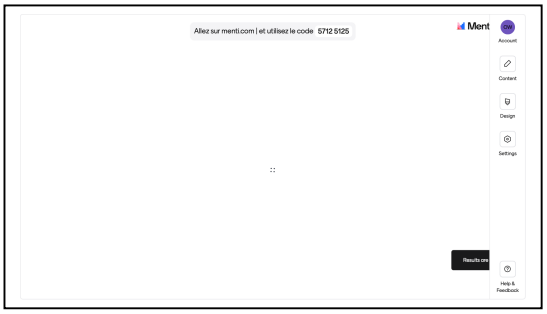
0



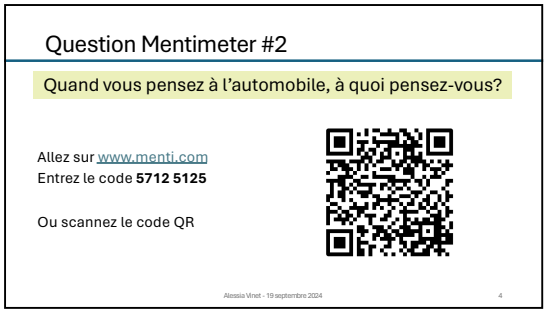
1



2



3



4



5

Conséquences individuelles de l'automobile

Source d'appauvrissement importante

Posséder une voiture coûte annuellement en moyenne 8 000$ à 13 000$

2e source de dépenses pour les ménages québécois

Calculateur de coûts par CAA

Effets néfastes sur la santé

Baisse de l'activité physique et augmentation de la sédentarité

→ 26,8% de la population canadienne en situation d'obésité (2018)

6

Conséquences sociales



Gas à effet de serre
→22% transport de personnes

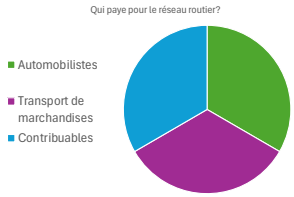
Qualité de l'air
→ Composés organiques volatils (COV), NOx, SOx, PM2.5
→ Décès annuels prématurés au Canada ~ 15 300 personnes

Pollution sonore

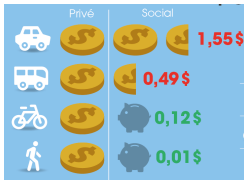
7

Conséquences sociales

Coût de l'infrastructure



Coût social par $ en coûts privés



Calculateur de coûts

8

Conséquences sociales

Danger **imposé aux autres**

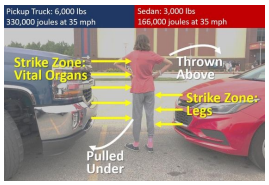
Bilan routier 2023:

~ 380 morts

~ 1270 blessés graves

~ 27 800 blessés légèrement

50% des hospitalisations = piétons et cyclistes



9

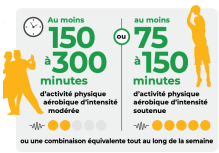
Les bienfaits du transport actif

Meilleure santé cardiovasculaire



48% de la population québécoise (18-44 ans) n'est pas assez active!

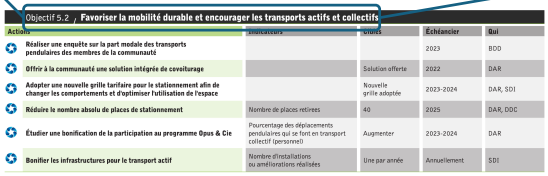
Aide à atteindre les recommandations d'activité physique de l'OMS



10

Les objectifs de Polytechnique

Favoriser la mobilité durable et encourager les transports actifs et collectifs



Objectif 5.2 : **Favoriser la mobilité durable et encourager les transports actifs et collectifs**

Actions	Indicateurs	Cibles	Échéancier	Qui
Réaliser une enquête sur la part modale des transports pendulaires des membres de la communauté			2023	BDD
Offrir à la communauté une solution intégrée de covoiturage		Solution offerte	2022	DAR
Adopter une nouvelle grille tarifaire pour le stationnement afin de changer les comportements et d'optimiser l'utilisation de l'espace		Nouvelle grille adoptée	2023-2024	DAR, SDI
Réduire le nombre absolu de places de stationnement	Nombre de places retirées	40	2025	DAR, DDC
Étudier une bonification de la participation au programme Opus & Cie	Pourcentage des déplacements pendulaires qui se font en transport collectif (personnel)	Augmenter	2023-2024	DAR
Bonifier les infrastructures pour le transport actif	Nombre d'installations ou améliorations réalisées	Une par année	Annuellement	SDI

11

«Ce sont vous les ingénieurs. On compte sur vous pour nous assurer un futur meilleur et plus durable»

-Kim Thúy

12

12

?

Questions

Contact
Alessia Vinet
alessia.vinet@polymtl.ca

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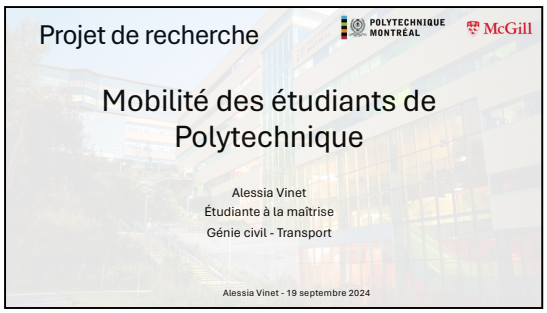
SAAQ. (s. d.). *Bilan routier 2021 : Baisse du nombre de personnes accidentées de 18,0 % par rapport à la moyenne de 2016 à 2020*. SAAQ. Consulté 16 septembre 2024, à l'adresse https://saaq.gouv.qc.ca/saaqdocumentation/bilan-routier

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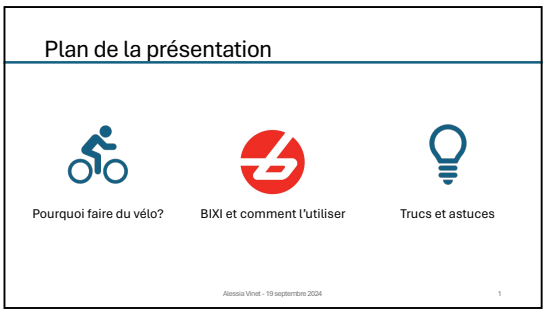
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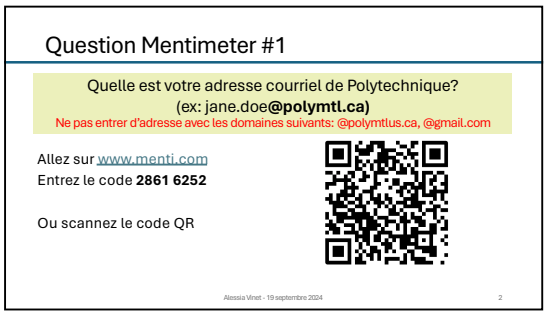
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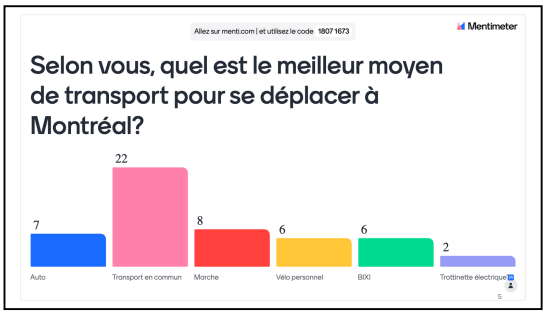
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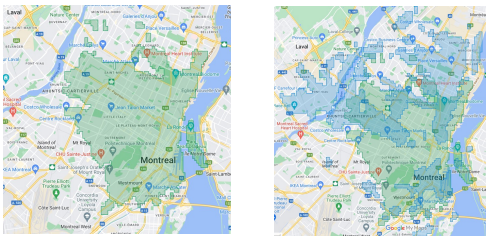
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5

Le vélo, c'est pratique!

Légende:
Zones en vert: vélo
Zones en bleu: Transport en commun

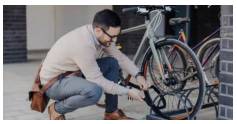


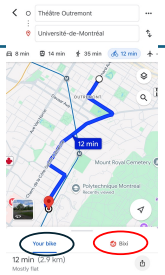
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Le vélo, c'est pratique!

→Meilleure planification

→Arriver directement à ta destination





7

BIXI: Comment l'utiliser?

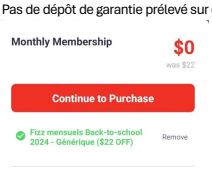


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BIXI: Promotion pour la rentrée

fizz

Abonnement mensuel gratuit
Code promotionnel: RENTRÉE
Durée: 30 jours depuis l'activation
Pas de dépôt de garantie prélevé sur carte de crédit





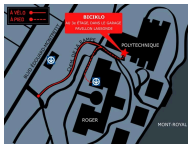
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Ateliers communautaires

- Espaces coopératifs
- Frais d'adhésion annuels ~ 10 à 20$







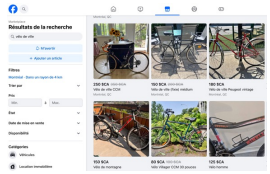
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11

Comment se procurer un vélo à budget limité?

Facebook Marketplace



Boutiques de vélo seconde main:

- Re-cycle Cycle
- Vélo urbain
- Atelier Vélo Re-Cycle
- Vélo Bienfait

Alessia Vinet - 19 septembre 2024 12

12

Comment se procurer un vélo à budget limité?

Vélos de ville chez Décathlon



Vélo de ville cadre bas - Elops 120 bleu/gris

Réf : 8417236

-15 % 380,00 $ ~~450,00 $~~

Lien vers la page



Vélo hybride avec freins à disque - HYTR 500

Réf : 8396804

490,00 $

Lien vers la page

Alessia Vinet - 19 septembre 2024 13

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Activités et formations de Vélo Québec



Toutes à vélo

Un programme d'apprentissage du vélo **par et pour les femmes** créé par Vélo Québec pour rendre accessible la pratique du vélo à des femmes qui n'ont jamais eu l'opportunité d'apprendre et leur permettre ainsi de découvrir les joies du cyclisme, tant comme activité de loisir que comme mode de transport.

Objectif du programme

Offrir un espace sécuritaire et accessible aux femmes pour apprendre et pratiquer le vélo.

Programme Toutes à vélo

Pratique cycliste

- Vélo urbain
- Vélo de montagne
- Vélo cargo
- Véloparc
- Fatbike
- Cyclotourisme
- L'hiver à vélo
- Les enfants à vélo
- Choisir et ajuster son vélo

Sécurité

- Rouler à vélo en temps de COVID-19
- Circuler en sécurité et partager la route
- Quoi faire en cas d'accident
- Contrer le vol de vélo
- Intégrité et sport sécuritaire

Communauté cycliste

- Clubs cyclistes au Québec
- Ateliers communautaires de mécanique vélo
- Guide d'implication citoyenne

Site web de Vélo Québec

Alessia Vinet - 19 septembre 2024 14

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«Ce sont vous les ingénieurs. On compte sur vous pour nous assurer un futur meilleur et plus durable»

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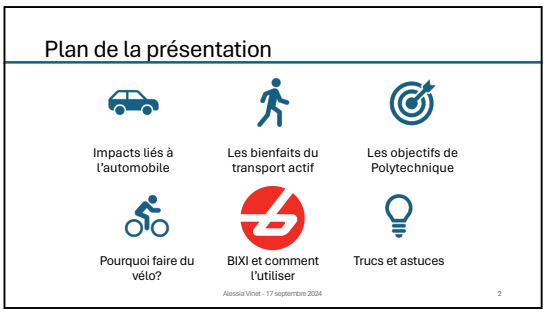
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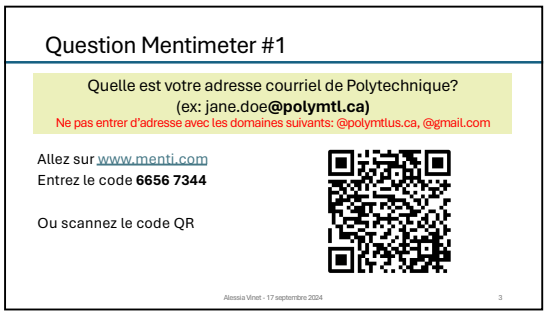
Intervention 3 (E3)



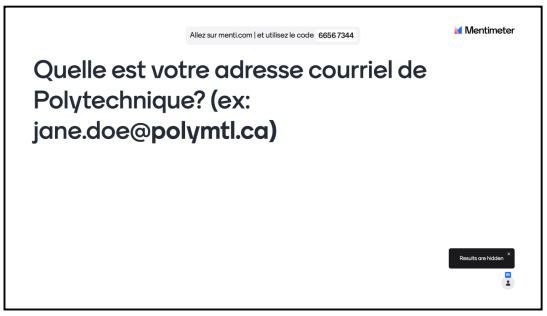
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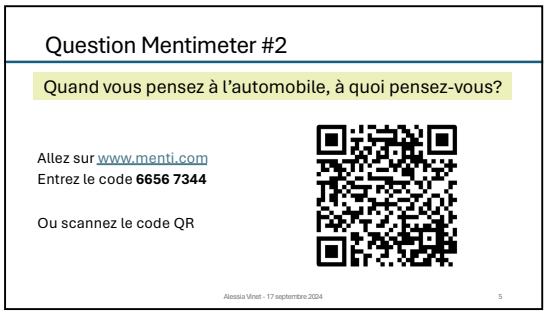
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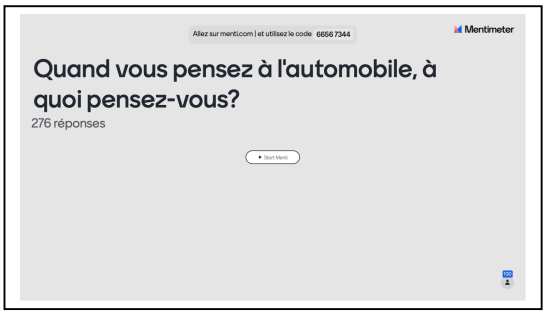
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6

Conséquences individuelles de l'automobile

Source d'appauvrissement importante

Posséder une voiture coûte annuellement en moyenne 8 000$ à 13 000$

2e source de dépenses pour les ménages québécois

Effets néfastes sur la santé

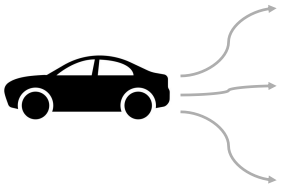
Baisse de l'activité physique et augmentation de la sédentarité

→ 26,8% de la population canadienne en situation d'obésité (2018)

Calculateur de coûts par CAA

7

Conséquences sociales



Gas à effet de serre
→22% des GES du Québec pour le transport de personnes

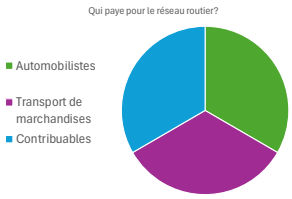
Qualité de l'air
→ Composés organiques volatils (COV), NOx, SOx, PM2.5
→ Décès annuels prématurés au Canada ~ 15 300 personnes

Pollution sonore

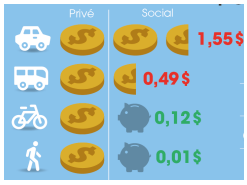
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Conséquences sociales

Coût de l'infrastructure



Coût social par $ en coûts privés



Calculateur de coûts

9

Conséquences sociales

Danger **imposé aux autres**

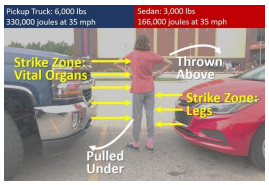
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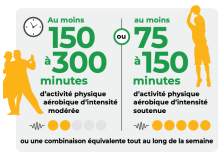
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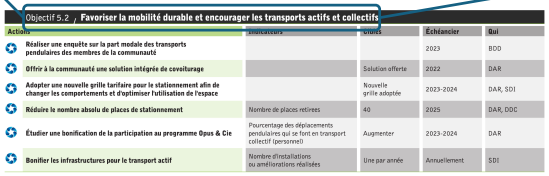
Aide à atteindre les recommandations d'activité physique de l'OMS



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Les objectifs de Polytechnique

Favoriser la mobilité durable et encourager les transports actifs et collectifs



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Bonifier les infrastructures pour le transport actif	Nombre d'installations ou améliorations réalisées	Une par année	Annuellement	SDI

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Question Mentimeter #3

Selon vous, quel est le meilleur moyen de transport pour se déplacer à Montréal?

Allez sur www.menti.com
Entrez le code **6656 7344**

Ou scannez le code QR

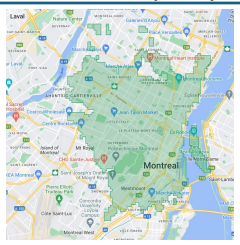
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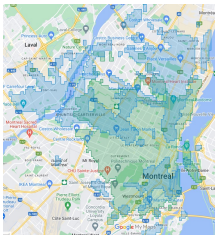
Validating...

14

Le vélo, c'est pratique!

Légende:
Zones en vert: vélo
Zones en bleu: Transport en commun



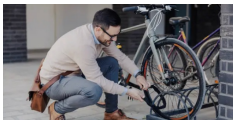


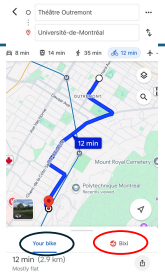
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BIXI: Comment l'utiliser?

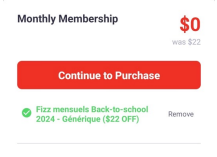


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BIXI: Promotion pour la rentrée

fizz

Abonnement mensuel gratuit
Code promotionnel: RENTRÉE
Durée: 30 jours après l'activation
Pas de dépôt de garantie prélevé sur carte de crédit





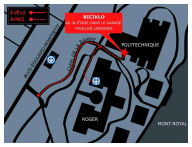
18

Ateliers communautaires

- Espaces coopératifs
- Frais d'adhésion annuels ~ 10 à 20$







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POLYTECHNIQUE MONTRÉAL
UNIVERSITÉ D'INGÉNIERIE

BICIKL

ATELIER DE VÉLO COMMUNAUTAIRE

VIENS NOUS VOIR!

- DEVANT LA STATION DE MÉTRO UDEM-

JOURNÉE MISES AU POINT
VIENS RÉPARER TON VÉLO AVEC NOUS

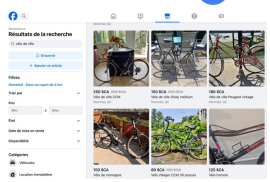
QUAND : VENDREDI 27 SEPTEMBRE

DE 9H À 18H

20

Comment se procurer un vélo à budget limité?

Facebook Marketplace



Boutiques de vélo seconde main:

- Re-cycle Cycle
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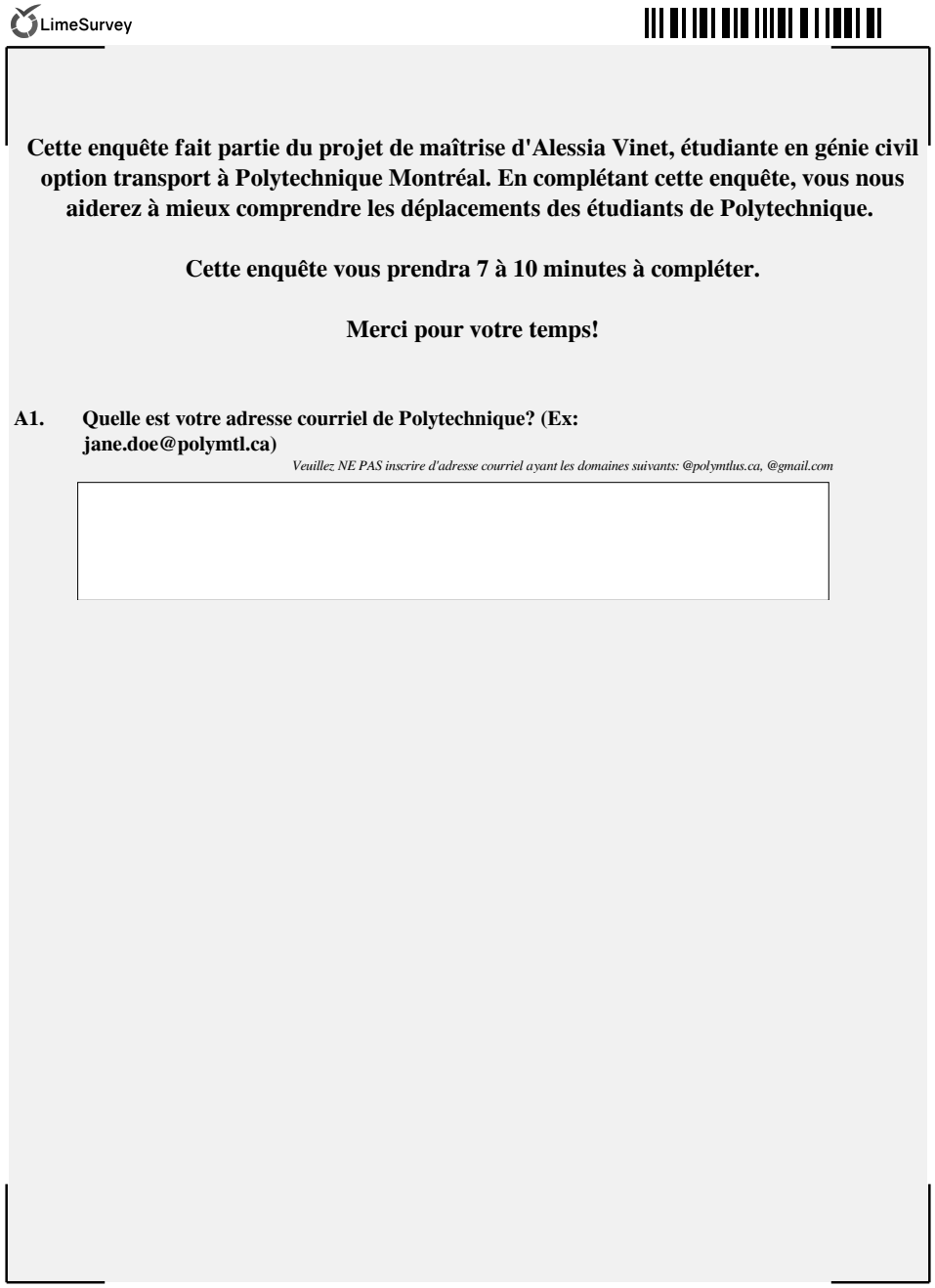
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APPENDIX C FIRST SURVEY (*PRE-INTERVENTION*) DISTRIBUTED TO STUDENTS AND ITS CONSENT FORM

Survey



LimeSurvey

Cette enquête fait partie du projet de maîtrise d'Alessia Vinet, étudiante en génie civil option transport à Polytechnique Montréal. En complétant cette enquête, vous nous aiderez à mieux comprendre les déplacements des étudiants de Polytechnique.

Cette enquête vous prendra 7 à 10 minutes à compléter.

Merci pour votre temps!

A1. Quelle est votre adresse courriel de Polytechnique? (Ex: jane.doe@polymtl.ca)

Veuillez NE PAS inscrire d'adresse courriel ayant les domaines suivants: @polymtlus.ca, @gmail.com

LimeSurvey

A2. Dans quel programme êtes-vous inscrit à Polytechnique?

- [ ] Génie aérospatial
- [ ] Génie biomédical
- [ ] Génie chimique
- [ ] Génie civil
- [ ] Génie électrique
- [ ] Génie géologique
- [ ] Génie industriel
- [ ] Génie informatique
- [ ] Génie logiciel
- [ ] Génie mécanique
- [ ] Génie des mines
- [ ] Génie physique
- [ ] Cycles supérieurs
- [ ] Certificat
- [ ] Autre

Autre

LimeSurvey

B1. **Dans quel cours avez-vous été invité à répondre à ce sondage? Si vous êtes inscrits dans des groupes théorique et laboratoire différents, veuillez inscrire le groupe théorique.**

Le groupe de votre cours est affiché dans votre horaire.

- ☐ CIV1000 (Gr.01, Pr Raymond Desjardins)
- ☐ ELE1001 (Gr.01, Pr Alex Mouapi)
- ☐ ELE1001 (Gr.02, Pre Eva Alonso Ortiz)
- ☐ ELE1001 (Gr.03, Pre Yasmina Benabderrahmane)
- ☐ ELE1001 (Gr.04, Pre Yasmina Benabderrahmane)
- ☐ GCH1122 (Gr.01, Pr Patrice Farand)
- ☐ MEC1510 (Gr.01, Pr Jonathan Daniel-Rivest)
- ☐ MEC1510 (Gr.02, Pr Jonathan Daniel-Rivest)
- ☐ MEC1510 (Gr.04, Pr Jonathan Daniel-Rivest)
- ☐ MEC1510 (Gr.06, Pre Daphné Labrecque-Nadeau)
- ☐ MEC1510 (Gr.07, Pr François Riendeau)
- ☐ Autre

Autre

B2. **Durant l'année précédent votre admission à Polytechnique (septembre à mai), quelle était votre ou vos occupation(s)?(Cochez tout ce qui s'applique)**

- ☐ Études à l'université ou au Cégep
- ☐ Travail
- ☐ À la recherche d'emploi
- ☐ À la maison / sans emploi

LimeSurvey

Autre ☐

Autre

C1. Avez-vous une limitation fonctionnelle ou un enjeu de santé qui vous empêche de faire les choses suivantes:

	Non	Oui, mais c'est temporaire	Oui et c'est permanent
Marcher plus d'un coin de rue	☐	☐	☐
Faire du vélo	☐	☐	☐
Conduire un véhicule	☐	☐	☐

D1. Comment évaluez-vous votre capacité à faire du vélo?

- Je peux faire du vélo et je me sens en grande confiance de le faire. ☐
- Je peux faire du vélo et je me sens moyennement en confiance de le faire. ☐
- Je peux faire du vélo, mais je ne me sens pas en confiance de le faire. ☐
- Je ne peux pas faire de vélo parce que je ne sais pas comment. ☐
- Je ne peux pas faire de vélo en raison d'une limitation physique et/ou une condition médicale. ☐

E1. Avez-vous un permis de conduire?

NE PAS inclure un permis spécifique pour scooter (Classe 6D) qui ne permet pas de conduire une automobile.

- Oui, un permis d'apprenti conducteur(trice) (je peux conduire accompagné(e) seulement) ☐
- Oui, un permis probatoire ☐
- Oui, un permis de conduire complet ☐
- Non ☐

E2. Avez-vous accès à une voiture? (Cochez tout ce qui s'applique)

- Oui, ma propre voiture que je peux utiliser quand je veux ☐
- Oui, ma propre voiture que je partage avec les autres personnes de mon domicile ☐
- Oui, je peux emprunter la voiture d'une autre personne (famille, amis, etc.) avec qui j'habite ☐
- Oui, je peux emprunter la voiture d'une autre personne (famille, amis, etc.) avec qui je n'habite pas ☐
- Oui, j'ai un abonnement à Communauto ☐

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Non ☐

F1. Avez-vous utilisé BIXI (le service de vélopartage de Montréal) au cours des douze derniers mois ?

- Non et je ne suis pas intéressé ☐
- Non, mais je suis intéressé ☐
- Oui, mais je n'ai pas d'abonnement ☐
- Oui, j'ai un abonnement actif en ce moment ☐

F2. Quel type d'abonnement au transport collectif avez-vous ce mois-ci ?

- Passe pour la session (4 mois) ou passe annuelle ☐
- Passe mensuelle ☐
- Passe hebdomadaire ☐
- Billets individuels sur carte OPUS ☐
- Aucun ☐

F3. Possédez-vous personellement un vélo FONCTIONNEL que vous utilisez ou pourriez utiliser pour vous rendre à certaines destinations ? (Par exemple, travail, courses, recontres avec des amis, activités, etc.)

	Oui	Non	Incertain(e)
Vélo régulier	☐	☐	☐
Vélo à assistance électrique	☐	☐	☐

F4. Avez-vous un cadenas pour verrouiller votre vélo?

- Oui ☐
- Non ☐

LimeSurvey

G1. **La dernière fois que vous vous êtes déplacés à Polytechnique, quel mode de transport avez-vous utilisé pour vous y rendre?**

- [ ] Auto comme conducteur
- [ ] Auto comme passager
- [ ] Marche seulement
- [ ] Vélo personnel
- [ ] BIXI
- [ ] Marche + Transport collectif
- [ ] Vélo ou BIXI + Transport collectif
- [ ] Auto + Transport collectif
- [ ] Autre

Autre

G2. **Utilisez-vous parfois d'autres modes de transport pour vous rendre à Polytechnique? (Cochez tout ce qui s'applique)**

- [ ] Non
- [ ] Auto comme conducteur
- [ ] Auto comme passager
- [ ] Marche seulement
- [ ] Vélo personnel
- [ ] BIXI
- [ ] Marche + Transport collectif
- [ ] Vélo ou BIXI + Transport collectif
- [ ] Auto + Transport collectif

LimeSurvey

Autre

Autre

G3. Depuis le début de la session d'automne (26 août 2024), à quelle fréquence avez-vous utilisé les modes de transport suivants?

	Jamais	Moins d'un jour par semaine	1-2 jours par semaine	3-4 jours par semaine	5 jours ou plus par semaine
Automobile (conducteur ou passager)	☐	☐	☐	☐	☐
Transport en commun	☐	☐	☐	☐	☐
Marche	☐	☐	☐	☐	☐
Vélo (personnel)	☐	☐	☐	☐	☐
Pour nous assurer que vous êtes attentif(ive), veuillez sélectionner «3-4 jours par semaine»	☐	☐	☐	☐	☐
BIXI	☐	☐	☐	☐	☐

H1. Durant ces périodes de votre vie, à quelle fréquence utilisiez-vous le vélo pour vous déplacer?

	Jamais	Très rarement	Parfois	Souvent
Enfant âgé de 6 à 12 ans	☐	☐	☐	☐
Adolescent âgé de 13 à 17 ans	☐	☐	☐	☐
L'année précédent votre admission à Polytechnique	☐	☐	☐	☐
À l'été 2024	☐	☐	☐	☐

LimeSurvey

H2. Durant ces périodes de votre vie, à quelle fréquence utilisiez-vous le transport en commun pour vous déplacer?

	Jamais	Très rarement	Parfois	Souvent
Enfant âgé de 6 à 12 ans	☐	☐	☐	☐
Adolescent âgé de 13 à 17 ans	☐	☐	☐	☐
L'année précédent votre admission à Polytechnique	☐	☐	☐	☐
À l'été 2024	☐	☐	☐	☐

I1. Quelle affirmation décrit le mieux votre intention et votre <u>utilisation de l'auto</u> pour vos déplacements en général ?

- ☐ Je ne conduis pas ou n'ai pas accès à une auto, je planifie maintenir cette situation dans le futur.
- ☐ Je ne conduis pas ou n'ai pas accès à une auto, je prévois utiliser une auto dans le futur.
- ☐ J'utilise peu l'auto. J'essaie d'utiliser d'autres modes de transport que l'auto autant que possible. Je maintiendrai ou réduirai mon utilisation de l'auto dans les mois à venir.
- ☐ Il m'arrive parfois d'utiliser d'autres modes, mais j'utilise encore principalement l'auto. Mon objectif est de réduire mon utilisation actuelle de l'auto. Je sais quel trajet remplacer et quel mode de transport utiliser, mais je n'ai pas encore commencé à le faire régulièrement.
- ☐ J'utilise principalement l'auto, j'envisage de réduire l'utilisation de mon auto, mais je ne sais pas comment ni quand le faire.
- ☐ J'utilise principalement l'auto, j'aimerais réduire mon utilisation de l'auto, mais j'ai l'impression que c'est impossible.
- ☐ J'utilise principalement l'auto, j'en suis satisfait et je ne vois aucune raison de réduire mon utilisation de l'auto.

J1. Laquelle de ces affirmations décrit le mieux votre intention et votre <u>utilisation de la marche</u> pour vos déplacements quotidiens?

- ☐ Je fais peu ou pas de déplacements à pied, j'en suis satisfait et je ne vois aucune raison de marcher plus.
- ☐ Je fais peu ou pas de déplacements à pied, j'aimerais marcher plus mais je sens que c'est impossible.
- ☐ Je fais peu ou pas de déplacement à pied, j'aimerais marcher plus mais je ne sais pas trop comment l'intégrer dans ma vie quotidienne.
- ☐ Je fais peu de déplacements à pied, mon objectif est de commencer à en faire plus bientôt. Je sais quels déplacements remplacer, quel itinéraire emprunter, mais je n'ai pas encore commencé à le faire régulièrement.
- ☐ Je me déplace souvent à pied, mais je ne suis pas certain(e) de continuer dans le futur.
- ☐ Je me déplace souvent à pied, je maintiendrai ou augmenterai les trajets que je fais à pied dans les mois à venir.

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J2. Laquelle de ces affirmations décrit le mieux votre intention et votre <u>utilisation des transports en commun</u> pour vos déplacements quotidiens ?

- Je fais peu ou pas de déplacements en transport en commun. J'en suis satisfait et je ne vois aucune raison de l'utiliser plus. ☐
- Je fais peu ou pas de déplacements en transport en commun. J'aimerais l'utiliser plus mais je sens que c'est impossible. ☐
- Je fais peu ou pas de déplacements en transport en commun. J'aimerais l'utiliser plus mais je ne sais pas comment ni quand le faire. ☐
- Je fais peu de déplacements en transport en commun. Mon objectif est de commencer à en faire plus bientôt. Je sais quels déplacements remplacer, quel itinéraire emprunter, mais je n'ai pas encore commencé à le faire régulièrement. ☐
- Je me déplace souvent en transport en commun, mais je ne suis pas certain(e) de continuer dans le futur ☐
- Je me déplace souvent en transport en commun, je maintiendrai ou augmenterai les trajets que je fais en transport en commun dans les mois à venir. ☐

J3. Laquelle de ces affirmations décrit le mieux votre intention et votre <u>utilisation du vélo</u> pour vos déplacements quotidiens?

Dans ce cas, le vélo fait référence à un vélo personnel et à BIXI.

- Je fais peu ou pas de déplacements à vélo, j'en suis satisfait et je ne vois aucune raison d'en faire plus. ☐
- Je fais peu ou pas de déplacements à vélo, j'aimerais en faire plus mais je sens que c'est impossible. ☐
- Je fais peu ou pas de déplacements à vélo, j'aimerais en faire plus mais je ne sais pas comment ni quand le faire. ☐
- Je fais peu de déplacements à vélo. Mon objectif est de commencer à en faire plus bientôt. Je sais quels déplacements remplacer, quel itinéraire emprunter, mais je n'ai pas encore commencé à le faire régulièrement. ☐
- Je me déplace souvent à vélo, mais je ne suis pas certain(e) de continuer dans le futur. ☐
- Je me déplace souvent à vélo, je maintiendrai ou augmenterai les trajets que je fais à vélo dans les mois à venir. ☐

K1. Quel âge avez-vous ?

☐☐

K2. À quel genre vous identifiez-vous ?

- Femme ☐
- Homme ☐
- Autre/non-binaire ☐
- Préfère ne pas répondre ☐

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K3. **Veuillez indiquer le code postal de la principale adresse à laquelle vous résidez durant la semaine lorsque vous fréquentez Polytechnique.**

Je préfère ne pas répondre ☐

Code postal (ex: A1A 1A1) ☐

Code postal (ex: A1A 1A1)

L1. **Si vous avez choisi de ne pas répondre parce que vous préférez ne pas divulguer l'intégralité du code postal à 6 caractères, accepteriez-vous d'indiquer les 3 premiers caractères de votre code postal?**

Les 3 premiers caractères du code postal représentent des zones beaucoup plus vastes que le code postal à 6 caractères.

Je préfère ne pas répondre ☐

3 premiers caractères du code postal (ex: A1A) ☐

3 premiers caractères du code postal (ex: A1A)

L2. **Quelle est la situation d'habitation à cette adresse?**

J'habite chez mes parents ou autre membre de ma famille ☐

J'habite avec ma/mon partenaire ☐

J'habite avec un(e)/des colocataire(s) ☐

J'habite seul(e) ☐

Autre ☐

Autre

LimeSurvey

M1. Depuis combien de temps habitez-vous à cette adresse?

- ☐ Moins de 1 mois
- ☐ 1 à 6 mois
- ☐ 7 mois à environ 3 ans
- ☐ Plus de 3 ans

M2. Où habitiez-vous avant d'emménager à cette adresse?

- ☐ J'ai toujours habité à la même adresse
- ☐ Sur l'île de Montréal
- ☐ Laval, Rive-Sud, Rive-Nord
- ☐ Ailleurs au Québec
- ☐ Ailleurs au Canada
- ☐ Dans un autre pays – Précisez le pays:

Dans un autre pays – Précisez le pays:

M3. Dans quel quartier habitiez-vous?

- ☐ Ahuntsic-Cartierville
- ☐ Anjou
- ☐ Baie d'Urfé
- ☐ Beaconsfield
- ☐ Côte-des-Neiges-Notre-Dame-de-Grâce
- ☐ Côte-Saint-Luc
- ☐ Dollard-des-Ormeaux
- ☐ Dorval
- ☐ Hampstead
- ☐ Kirkland
- ☐ L'Île-Bizard-Sainte-Geneviève
- ☐ Lachine

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- [ ] Lasalle
- [ ] Le Plateau-Mont-Royal
- [ ] Mercier-Hochelaga-Maisonneuve
- [ ] Ville de Montréal-Est
- [ ] Montréal-Nord
- [ ] Montréal-Ouest
- [ ] Mont-Royal
- [ ] Outremont
- [ ] Pierrefonds-Roxboro
- [ ] Pointe-Claire
- [ ] Rivière-des-Praires-Pointe-aux-Trembles
- [ ] Rosemont-La Petite-Patrie
- [ ] Sainte-Anne-de-Bellevue
- [ ] Saint-Laurent
- [ ] Saint-Léonard
- [ ] Senneville
- [ ] Sud-Ouest
- [ ] Verdun
- [ ] Ville-Marie
- [ ] Villeray-Saint-Michel-Parc-Extension
- [ ] Westmount
- [ ] Je ne m'en souviens plus

M4. Depuis combien de temps vivez-vous à Montréal?

- [ ] Depuis moins de 1 mois
- [ ] Depuis 1 à 6 mois
- [ ] Depuis 7 mois à 3 ans
- [ ] Depuis 3 ans et plus

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M5. **À quel(s) autre(s) endroit(s) avez-vous habité dans votre vie? (Cochez tout ce qui s'applique)**

- [ ] Sur l'île de Montréal
- [ ] Laval, Rive-Sud, Rive-Nord
- [ ] Ailleurs au Québec
- [ ] Ailleurs au Canada
- [ ] Dans un autre pays – Précisez le(s) pays (séparer par des virgules si plusieurs):

Dans un autre pays – Précisez le(s) pays (séparer par des virgules si plusieurs):

M6. **Veuillez préciser la ville dans laquelle vous habitiez.**

Merci d'avoir complété notre enquête !

Consent form

Formulaire de consentement

Objectif de l'étude : Nous vous invitons à participer à une activité de recherche qui vise à comprendre les différents comportements de mobilité des étudiants en première année à Polytechnique Montréal.

Équipe de recherche :

- Alessia Vinet, Étudiante à la maîtrise, Département des génies civil, géologique et des mines, Polytechnique Montréal, alessia.vinet@polymtl.ca
- Owen Waygood, Professeur titulaire, Département des génies civil, géologique et des mines, Polytechnique Montréal, owen.waygood@polymtl.ca
- Kevin Manaugh, Professeur associé, Département de géographie et École Bieler de l'environnement, Université McGill, kevin.manaugh@mcgill.ca
- Jérôme Laviolette, Chercheur postdoctoral, Département de géographie, Université McGill, jerome.laviolette@mcgill.ca

Titre du projet: Les comportements de mobilité des étudiants en première année à Polytechnique Montréal

Financement : Fonds recherche du Québec – Nature et technologie (FRQNT) et fonds de recherche en sciences humaines du Canada (CRSH)

Procédure d'enquête : Dans cette enquête, il vous sera demandé des informations sociodémographiques, des informations géographiques (p. ex. : localisation de votre lieu de résidence ou code postal, lieu de plus fréquemment visité), des informations sur vos habitudes de transports et des questions sur votre parcours universitaire. Compléter ce sondage prendra **environ 7 à 10 minutes** de votre temps. De plus, il est possible que vous ayez une séance d'information sur le transport dans l'un de vos cours à la session d'automne 2024. Il vous sera demandé de répondre à deux enquêtes de suivi : en novembre 2024 et en mai 2025.

Participation : Votre participation est volontaire et vous pouvez choisir d'arrêter de répondre à n'importe quel moment du questionnaire. En cas de retrait, vous pouvez demander la destruction des données vous concernant. Cependant, il sera impossible de retirer vos données ou votre matériel des analyses menées une fois ces dernières publiées ou diffusées.

Risques et bénéfices potentiels : Il n'y a pas de risques ni de bénéfices personnels anticipés à votre participation à cette étude. Votre participation ou non à cette étude n'affectera pas les résultats du cours dans lequel vous avez été invité à participer à ce projet.

Compensation : L'équipe de recherche n'offre aucune compensation pour la participation à cette enquête.

Confidentialité : L'équipe de recherche recueillera et consignera toutes vos données de manière sécuritaire de façon à en protéger le caractère confidentiel. Seule votre adresse courriel de Polytechnique vous sera demandée pour vous identifier.

Les données collectées grâce à cette enquête pourront être utilisées pour le présent projet de recherche et pourront être présentées, de façon agrégée, dans des publications scientifiques, des rapports et des présentations de recherche.

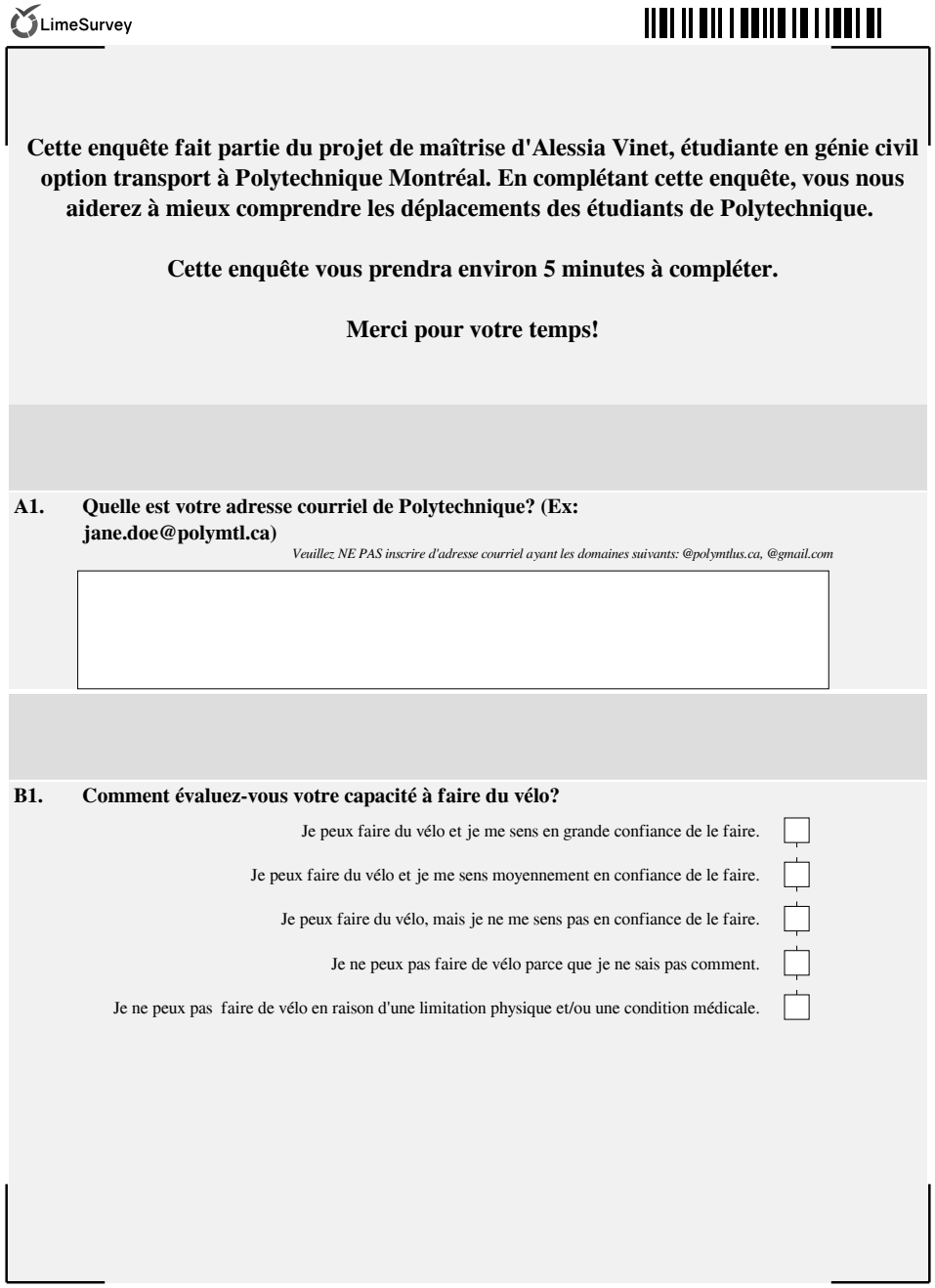
Si vous avez des questions concernant cette étude, s'il vous plait, contactez le chercheur principal, Owen Waygood, par courriel à owen.waygood@polymtl.ca.

Si vous avez des considérations d'ordre éthique ou des plaintes concernant cette étude et si vous souhaitez parler à quelqu'un qui n'est pas dans l'équipe de recherche, vous pouvez contacter la directrice associée du comité d'éthique à la recherche de l'Université McGill au (514)398-6831 ou par courriel à lynda.mcneil@mcgill.ca.

Vous pouvez télécharger une version imprimable (format PDF) de ce formulaire pour préserver dans vos dossiers à des fins de référence.

APPENDIX D SECOND SURVEY (*POST-INTERVENTION 1*) DISTRIBUTED TO STUDENTS AND ITS CONSENT FORM

Survey



LimeSurvey

Cette enquête fait partie du projet de maîtrise d'Alessia Vinet, étudiante en génie civil option transport à Polytechnique Montréal. En complétant cette enquête, vous nous aiderez à mieux comprendre les déplacements des étudiants de Polytechnique.

Cette enquête vous prendra environ 5 minutes à compléter.

Merci pour votre temps!

A1. **Quelle est votre adresse courriel de Polytechnique? (Ex: jane.doe@polymtl.ca)**

Veuillez NE PAS inscrire d'adresse courriel ayant les domaines suivants: @polymtlus.ca, @gmail.com

B1. **Comment évaluez-vous votre capacité à faire du vélo?**

- ☐ Je peux faire du vélo et je me sens en grande confiance de le faire.
- ☐ Je peux faire du vélo et je me sens moyennement en confiance de le faire.
- ☐ Je peux faire du vélo, mais je ne me sens pas en confiance de le faire.
- ☐ Je ne peux pas faire de vélo parce que je ne sais pas comment.
- ☐ Je ne peux pas faire de vélo en raison d'une limitation physique et/ou une condition médicale.

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C1. Avez-vous utilisé BIXI depuis le début de la session?

- ☐ Non
- ☐ Oui pour la première fois
- ☐ Oui et je l'avais déjà utilisé avant

C2. Quel type d'abonnement au transport collectif avez-vous pour le mois de novembre?

- ☐ Passe pour la session (4 mois) ou passe annuelle
- ☐ Passe mensuelle
- ☐ Passe hebdomadaire
- ☐ Billets individuels sur carte OPUS
- ☐ Aucun

C3. Possédez-vous personellement un vélo FONCTIONNEL que vous utilisez ou pourriez utiliser pour vous rendre à certaines destinations ? (Par exemple, travail, courses, recontres avec des amis, activités, etc.)

	Oui	Non	Incertain(e)
Vélo régulier	☐	☐	☐
Vélo à assistance électrique	☐	☐	☐

C4. Avez-vous un cadenas pour verrouiller votre vélo?

- ☐ Oui
- ☐ Non

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D1. **La dernière fois que vous vous êtes déplacé.e à Polytechnique, quel mode de transport avez-vous utilisé pour vous y rendre?**

- [ ] Auto comme conducteur
- [ ] Auto comme passager
- [ ] Marche seulement
- [ ] Vélo personnel
- [ ] BIXI
- [ ] Marche + Transport collectif
- [ ] Vélo ou BIXI + Transport collectif
- [ ] Auto + Transport collectif
- [ ] Autre

Autre

D2. **Utilisez-vous parfois d'autres modes de transport pour vous rendre à Polytechnique?**

- [ ] Non
- [ ] Auto comme conducteur
- [ ] Auto comme passager
- [ ] Marche seulement
- [ ] Vélo personnel
- [ ] BIXI
- [ ] Marche + Transport collectif
- [ ] Vélo ou BIXI + Transport collectif
- [ ] Auto + Transport collectif

LimeSurvey

Autre

Autre

D3. Durant les 30 derniers jours, à quelle fréquence avez-vous utilisé les modes de transport suivants?

	Jamais	Moins d'un jour par semaine	1-2 jours par semaine	3-4 jours par semaine	5 jours ou plus par semaine
Automobile (conducteur ou passager)	☐	☐	☐	☐	☐
Transport en commun	☐	☐	☐	☐	☐
Marche	☐	☐	☐	☐	☐
Vélo (personnel)	☐	☐	☐	☐	☐
Pour nous assurer que vous êtes attentif(ive), veuillez sélectionner «3-4 jours par semaine»	☐	☐	☐	☐	☐
BIXI	☐	☐	☐	☐	☐

E1. Avez-vous répondu à la question précédente en considérant uniquement vos déplacements vers Polytechnique ou en considérant l'ensemble des déplacements que vous faites dans votre quotidien?

- ☐ J'ai seulement considéré mes déplacements vers Polytechnique
- ☐ J'ai considéré l'ensemble des déplacements que je fais dans mon quotidien

LimeSurvey

F1. **Durant les 30 derniers jours, à quelle fréquence avez-vous utilisé les modes de transport suivants pour <u>l'ensemble de vos déplacements</u> (incluant vous rendre à Poly, épicerie, restaurant ou bar, voir des amis ou famille, etc.) ?**

	Jamais	Moins d'un jour par semaine	1-2 jours par semaine	3-4 jours par semaine	5 jours ou plus par semaine
Automobile (conducteur ou passager)	☐	☐	☐	☐	☐
Transport en commun	☐	☐	☐	☐	☐
Marche	☐	☐	☐	☐	☐
Vélo (personnel)	☐	☐	☐	☐	☐
Pour nous assurer que vous êtes attentif(ive), veuillez sélectionner «3-4 jours par semaine»	☐	☐	☐	☐	☐
BIXI	☐	☐	☐	☐	☐

G1. **Quelle affirmation décrit le mieux votre intention et <u>votre utilisation de l'auto</u> pour vos déplacements en général ?**

- Je ne conduis pas ou n'ai pas accès à une auto, je planifie maintenir cette situation dans le futur. ☐
- Je ne conduis pas ou n'ai pas accès à une auto, je prévois utiliser une auto dans le futur. ☐
- J'utilise peu l'auto. J'essaie d'utiliser d'autres modes de transport que l'auto autant que possible. Je maintiendrai ou réduirai mon utilisation de l'auto dans les mois à venir. ☐
- Il m'arrive parfois d'utiliser d'autres modes, mais j'utilise encore principalement l'auto. Mon objectif est de réduire mon utilisation actuelle de l'auto. Je sais quel trajet remplacer et quel mode de transport utiliser, mais je n'ai pas encore commencé à le faire régulièrement. ☐
- J'utilise principalement l'auto, j'envisage de réduire l'utilisation de mon auto, mais je ne sais pas comment ni quand le faire. ☐
- J'utilise principalement l'auto, j'aimerais réduire mon utilisation de l'auto, mais j'ai l'impression que c'est impossible. ☐
- J'utilise principalement l'auto, j'en suis satisfait et je ne vois aucune raison de réduire mon utilisation de l'auto. ☐

LimeSurvey

H1. Laquelle de ces affirmations décrit le mieux votre intention et votre utilisation de la marche pour vos déplacements quotidiens?

- Je fais peu ou pas de déplacements à pied, j'en suis satisfait et je ne vois aucune raison de marcher plus. ☐
- Je fais peu ou pas de déplacements à pied, j'aimerais marcher plus mais je sens que c'est impossible. ☐
- Je fais peu ou pas de déplacement à pied, j'aimerais marcher plus mais je ne sais pas trop comment l'intégrer dans ma vie quotidienne. ☐
- Je fais peu de déplacements à pied, mon objectif est de commencer à en faire plus bientôt. Je sais quels déplacements remplacer, quel itinéraire emprunter, mais je n'ai pas encore commencé à le faire régulièrement. ☐
- Je me déplace souvent à pied, mais je ne suis pas certain(e) de continuer dans le futur. ☐
- Je me déplace souvent à pied, je maintiendrai ou augmenterai les trajets que je fais à pied dans les mois à venir. ☐

H2. Laquelle de ces affirmations décrit le mieux votre intention et votre utilisation des transports en commun pour vos déplacements quotidiens ?

- Je fais peu ou pas de déplacements en transport en commun. J'en suis satisfait et je ne vois aucune raison de l'utiliser plus. ☐
- Je fais peu ou pas de déplacements en transport en commun. J'aimerais l'utiliser plus mais je sens que c'est impossible. ☐
- Je fais peu ou pas de déplacements en transport en commun. J'aimerais l'utiliser plus mais je ne sais pas comment ni quand le faire. ☐
- Je fais peu de déplacements en transport en commun. Mon objectif est de commencer à en faire plus bientôt. Je sais quels déplacements remplacer, quel itinéraire emprunter, mais je n'ai pas encore commencé à le faire régulièrement. ☐
- Je me déplace souvent en transport en commun, mais je ne suis pas certain(e) de continuer dans le futur ☐
- Je me déplace souvent en transport en commun, je maintiendrai ou augmenterai les trajets que je fais en transport en commun dans les mois à venir. ☐

H3. Laquelle de ces affirmations décrit le mieux votre intention et votre utilisation du vélo pour vos déplacements quotidiens?

Dans ce cas, le vélo fait référence à un vélo personnel et à BIXI.

- Je fais peu ou pas de déplacements à vélo, j'en suis satisfait et je ne vois aucune raison d'en faire plus. ☐
- Je fais peu ou pas de déplacements à vélo, j'aimerais en faire plus mais je sens que c'est impossible. ☐
- Je fais peu ou pas de déplacements à vélo, j'aimerais en faire plus mais je ne sais pas comment ni quand le faire. ☐
- Je fais peu de déplacements à vélo. Mon objectif est de commencer à en faire plus bientôt. Je sais quels déplacements remplacer, quel itinéraire emprunter, mais je n'ai pas encore commencé à le faire régulièrement. ☐
- Je me déplace souvent à vélo, mais je ne suis pas certain(e) de continuer dans le futur. ☐
- Je me déplace souvent à vélo, je maintiendrai ou augmenterai les trajets que je fais à vélo dans les mois à venir. ☐

LimeSurvey

I1. **Dans le contexte de la région de Montréal, les modes de transport suivants devraient-ils être plus ou moins soutenus :**

-10 = Beaucoup moins de soutien

0 = Pas de changement

10 = Beaucoup plus de soutien

Autobus	
Marche	
Rail (métro, train, tram, REM, etc.)	
Vélo	
Voiture privée	

I2. **Pensez-vous qu'il faut accorder plus ou moins d'espace à chacun de ces modes? Veuillez déplacer le curseur pour indiquer votre réponse.**

-10 = Beaucoup moins d'espace

0 = Pas de changement

10 = Beaucoup plus d'espace

Autobus	
Marche	
Rail (métro, train, tram, REM, etc.)	
Vélo	
Voiture privée	

LimeSurvey

I3. **Les modes de transport suivants nécessitent-ils plus ou moins d'infrastructures?**

-10 = Beaucoup moins d'infrastructures

0 = Pas de changement

10 = Beaucoup plus d'infrastructures

Autobus	
Marche	
Rail (métro, train, tram, REM, etc.)	
Vélo	
Voiture privée	

I4. **Les modes suivants nécessitent-ils un investissement financier plus ou moins important ?Veuillez déplacer le curseur pour indiquer votre réponse.**

-10 = Beaucoup moins d'investissements financiers

0 = Pas de changement

10 = Beaucoup plus d'investissements financiers

Autobus	
Marche	
Rail (métro, train, tram, REM, etc.)	
Vélo	
Voiture privée	

J1. **Avez-vous déménagé depuis que vous avez complété la première version de cette enquête le TOKEN:ATTRIBUTE_2?**

- [ ] Oui
- [ ] Non

LimeSurvey

K1. Quelle est la situation d'habitation à votre nouvelle adresse?

- [ ] J'habite chez mes parents ou autre membre de ma famille
- [ ] J'habite avec ma/mon partenaire
- [ ] J'habite avec un(e)/des colocataire(s)
- [ ] J'habite seul(e)
- [ ] Autre

Autre

K2. Où se situe votre nouvelle adresse à laquelle vous habitez durant la semaine lorsque vous fréquentez Polytechnique?

- [ ] Sur l'île de Montréal
- [ ] Laval
- [ ] Rive-Sud, Rive-Nord
- [ ] Ailleurs au Québec

K3. Dans quel quartier habitez-vous?

- [ ] Ahuntsic-Cartierville
- [ ] Anjou
- [ ] Baie d'Urfé
- [ ] Beaconsfield
- [ ] Côte-des-Neiges-Notre-Dame-de-Grâce
- [ ] Côte-Saint-Luc
- [ ] Dollard-des-Ormeaux
- [ ] Dorval
- [ ] Hampstead
- [ ] Kirkland

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- L'Île-Bizard-Sainte-Geneviève ☐
- Lachine ☐
- Lasalle ☐
- Le Plateau-Mont-Royal ☐
- Mercier-Hochelaga-Maisonneuve ☐
- Ville de Montréal-Est ☐
- Montréal-Nord ☐
- Montréal-Ouest ☐
- Mont-Royal ☐
- Outremont ☐
- Pierrefonds-Roxboro ☐
- Pointe-Claire ☐
- Rivière-des-Praires-Pointe-aux-Trembles ☐
- Rosemont-La Petite-Patrie ☐
- Sainte-Anne-de-Bellevue ☐
- Saint-Laurent ☐
- Saint-Léonard ☐
- Senneville ☐
- Sud-Ouest ☐
- Verdun ☐
- Ville-Marie ☐
- Villeray-Saint-Michel-Parc-Extension ☐
- Westmount ☐
- Je ne sais pas ☐

K4. Veuillez préciser la ville dans laquelle vous habitez.

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K5. **Veuillez indiquer le code postal de votre nouvelle adresse.**

Je préfère ne pas répondre ☐

Code postal (ex: A1A 1A1) ☐

Code postal (ex: A1A 1A1)

K6. **Si vous avez choisi de ne pas répondre parce que vous préférez ne pas divulguer l'intégralité du code postal à 6 caractères, accepteriez-vous d'indiquer les 3 premiers caractères de votre code postal?**

Les 3 premiers caractères du code postal représentent des zones beaucoup plus vastes que le code postal à 6 caractères.

Je préfère ne pas répondre ☐

3 premiers caractères du code postal (ex: A1A) ☐

3 premiers caractères du code postal (ex: A1A)

K7. **Où résidez-vous durant la semaine lorsque vous fréquentez Polytechnique?**

Sur l'île de Montréal ☐

Laval ☐

Rive-Sud, Rive-Nord ☐

Ailleurs au Québec ☐

K8. **Dans quel quartier habitez-vous?**

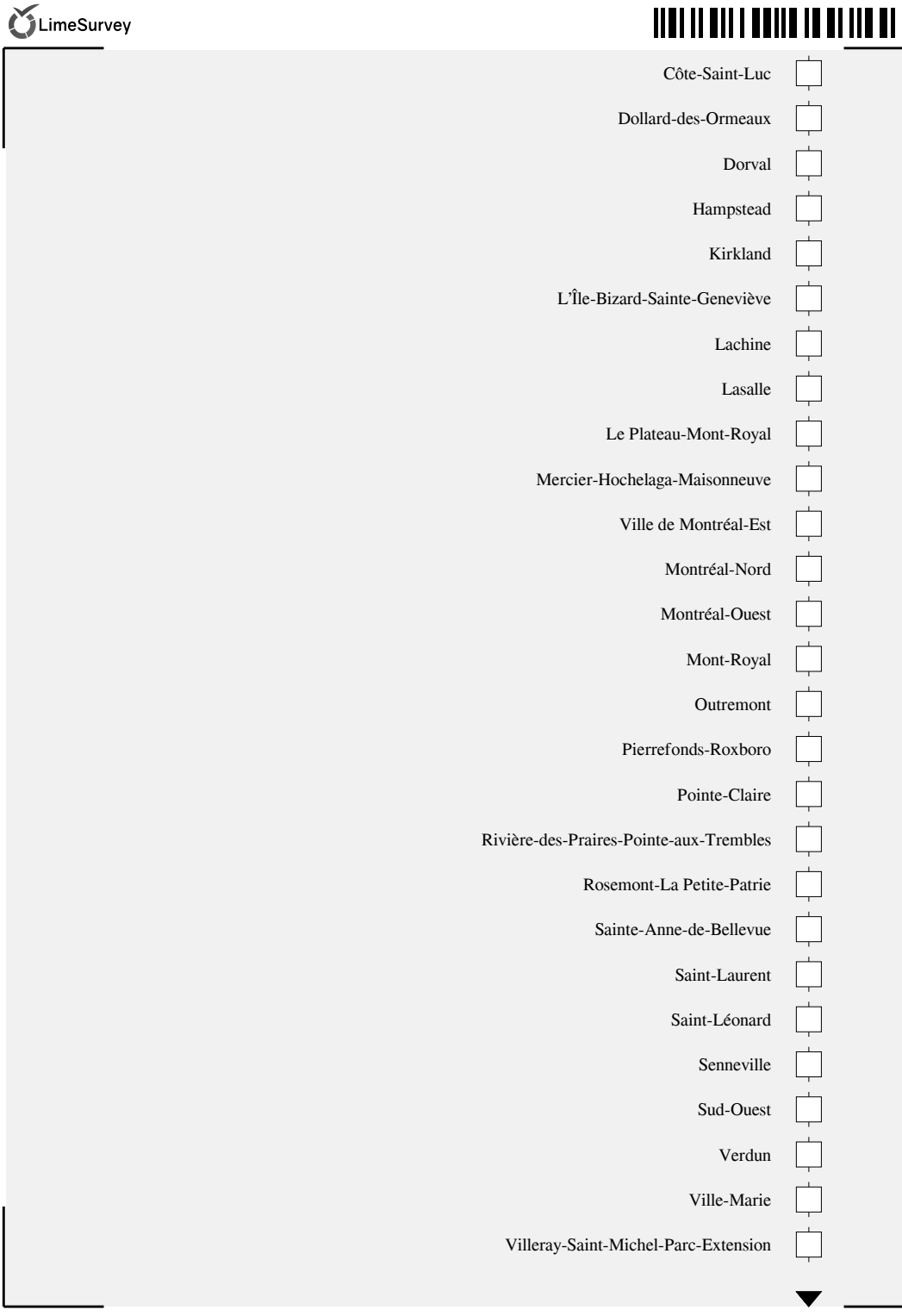
Ahuntsic-Cartierville ☐

Anjou ☐

Baie d'Urfé ☐

Beaconsfield ☐

Côte-des-Neiges-Notre-Dame-de-Grâce ☐


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Côte-Saint-Luc
Dollard-des-Ormeaux
Dorval
Hampstead
Kirkland
L'Île-Bizard-Sainte-Geneviève
Lachine
Lasalle
Le Plateau-Mont-Royal
Mercier-Hochelaga-Maisonneuve
Ville de Montréal-Est
Montréal-Nord
Montréal-Ouest
Mont-Royal
Outremont
Pierrefonds-Roxboro
Pointe-Claire
Rivière-des-Praires-Pointe-aux-Trembles
Rosemont-La Petite-Patrie
Sainte-Anne-de-Bellevue
Saint-Laurent
Saint-Léonard
Senneville
Sud-Ouest
Verdun
Ville-Marie
Villeray-Saint-Michel-Parc-Extension

LimeSurvey

Westmount ☐

Je ne sais pas ☐

K9. Veuillez préciser la ville dans laquelle vous habitez.

Merci d'avoir complété notre enquête !

Consent form

Formulaire de consentement

Objectif de l'étude : Nous vous invitons à participer à une activité de recherche qui vise à comprendre les différents comportements de mobilité des étudiants en première année à Polytechnique Montréal.

Équipe de recherche :

- Alessia Vinet, Étudiante à la maîtrise, Département des génies civil, géologique et des mines, Polytechnique Montréal, alessia.vinet@polymtl.ca
- Owen Waygood, Professeur titulaire, Département des génies civil, géologique et des mines, Polytechnique Montréal, owen.waygood@polymtl.ca
- Kevin Manaugh, Professeur associé, Département de géographie et École Bieler de l'environnement, Université McGill, kevin.manaugh@mcgill.ca
- Jérôme Laviolette, Chercheur postdoctoral, Département de géographie, Université McGill, jerome.laviolette@mcgill.ca

Titre du projet: Les comportements de mobilité des étudiants en première année à Polytechnique Montréal

Financement : Fonds recherche du Québec – Nature et technologie (FRQNT) et fonds de recherche en sciences humaines du Canada (CRSH)

Procédure d'enquête : Dans cette enquête, il vous sera demandé des informations géographiques (p. ex. : localisation de votre lieu de résidence ou code postal, lieu le plus fréquemment visité) et des informations sur vos habitudes de transports. Compléter ce sondage prendra **environ 5 minutes** de votre temps. Il vous sera demandé de répondre à une dernière enquête de suivi en mai 2025.

Participation : Votre participation est volontaire et vous pouvez choisir d'arrêter de répondre à n'importe quel moment du questionnaire. En cas de retrait, vous pouvez demander la destruction des données vous concernant. Cependant, il sera impossible de retirer vos données ou votre matériel des analyses menées une fois ces dernières publiées ou diffusées.

Risques et bénéfices potentiels : Il n'y a pas de risques ni de bénéfices personnels anticipés à votre participation à cette étude. Votre participation ou non à cette étude n'affectera pas les résultats du cours dans lequel vous avez été invité à participer à ce projet.

Compensation : L'équipe de recherche n'offre aucune compensation pour la participation à cette enquête.

Confidentialité : L'équipe de recherche recueillera et consignera toutes vos données de manière sécuritaire de façon à en protéger le caractère confidentiel. Seule votre adresse courriel de Polytechnique vous sera demandée pour vous identifier.

Les données collectées grâce à cette enquête pourront être utilisées pour le présent projet de recherche et pourront être présentées, de façon agrégée, dans des publications scientifiques, des rapports et des présentations de recherche.

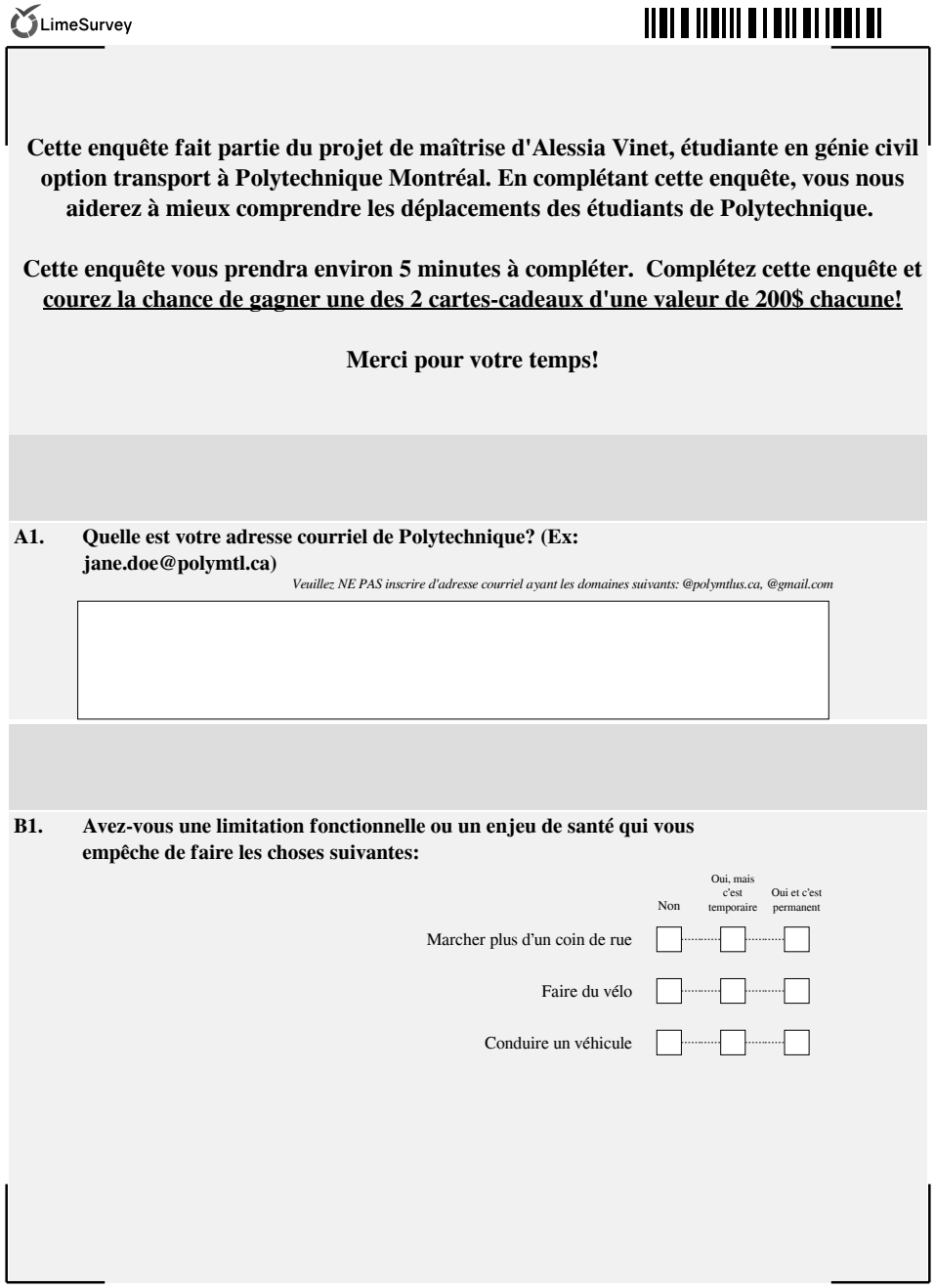
Si vous avez des questions concernant cette étude, s'il vous plait, contactez le chercheur principal, Owen Waygood, par courriel à owen.waygood@polymtl.ca.

Si vous avez des considérations d'ordre éthique ou des plaintes concernant cette étude et si vous souhaitez parler à quelqu'un qui n'est pas dans l'équipe de recherche, vous pouvez contacter la directrice associée du comité d'éthique à la recherche de l'Université McGill au (514)398-6831 ou par courriel à lynda.mcneil@mcgill.ca.

Vous pouvez télécharger une version imprimable (format PDF) de ce formulaire pour préserver dans vos dossiers à des fins de référence.

APPENDIX E THIRD SURVEY (*POST-INTERVENTION 2*) DISTRIBUTED TO STUDENTS AND ITS CONSENT FORM

Survey



LimeSurvey

Cette enquête fait partie du projet de maîtrise d'Alessia Vinet, étudiante en génie civil option transport à Polytechnique Montréal. En complétant cette enquête, vous nous aiderez à mieux comprendre les déplacements des étudiants de Polytechnique.

Cette enquête vous prendra environ 5 minutes à compléter. Complétez cette enquête et courez la chance de gagner une des 2 cartes-cadeaux d'une valeur de 200$ chacune!

Merci pour votre temps!

A1. **Quelle est votre adresse courriel de Polytechnique? (Ex: jane.doe@polymtl.ca)**

Veuillez NE PAS inscrire d'adresse courriel ayant les domaines suivants: @polymtlus.ca, @gmail.com

B1. **Avez-vous une limitation fonctionnelle ou un enjeu de santé qui vous empêche de faire les choses suivantes:**

	Non	Oui, mais c'est temporaire	Oui et c'est permanent
Marcher plus d'un coin de rue	☐	☐	☐
Faire du vélo	☐	☐	☐
Conduire un véhicule	☐	☐	☐

LimeSurvey

C1. Comment évaluez-vous votre capacité à faire du vélo?

- ☐ Je peux faire du vélo et je me sens en grande confiance de le faire.
- ☐ Je peux faire du vélo et je me sens moyennement en confiance de le faire.
- ☐ Je peux faire du vélo, mais je ne me sens pas en confiance de le faire.
- ☐ Je ne peux pas faire de vélo parce que je ne sais pas comment.
- ☐ Je ne peux pas faire de vélo en raison d'une limitation physique et/ou une condition médicale.

D1. Avez-vous un permis de conduire?

NE PAS inclure un permis spécifique pour scooter (Classe 6D) qui ne permet pas de conduire une automobile.

- ☐ Oui, un permis d'apprenti conducteur(trice) (je peux conduire accompagné(e) seulement)
- ☐ Oui, un permis probatoire
- ☐ Oui, un permis de conduire complet
- ☐ Non

D2. Avez-vous accès à une voiture? (Cochez tout ce qui s'applique)

- ☐ Oui, ma propre voiture que je peux utiliser quand je veux
- ☐ Oui, ma propre voiture que je partage avec les autres personnes de mon domicile
- ☐ Oui, je peux emprunter la voiture d'une autre personne (famille, amis, etc.) avec qui j'habite
- ☐ Oui, je peux emprunter la voiture d'une autre personne (famille, amis, etc.) avec qui je n'habite pas
- ☐ Oui, j'ai un abonnement à Communauto
- ☐ Non

E1. Avez-vous l'application BIXI sur votre téléphone?

- ☐ Oui
- ☐ Non

LimeSurvey

E2. **Avez-vous utilisé BIXI durant la saison hivernale (décembre 2024 à mars 2025)?**

- ☐ Non
- ☐ Oui pour la première fois
- ☐ Oui et je l'avais déjà utilisé avant

E3. **Depuis le début de la saison estivale BIXI (avril 2025), avez-vous utilisé BIXI?**

- ☐ Non
- ☐ Oui pour la première fois
- ☐ Oui et je l'avais déjà utilisé avant

E4. **1**

E5. **Saviez-vous que les membres de la communauté de Polytechnique Montréal ont accès à un rabais de 25% sur l'abonnement saisonnier de BIXI? Cliquez ici pour avoir les détails! L'offre prend fin le 31 mai 2025.**

- ☐ Oui, je le savais
- ☐ Non, je n'étais pas au courant

E6. **Avez-vous l'intention d'utiliser BIXI pour vous déplacer cet été?**

- ☐ Très improbable
- ☐ Improbable
- ☐ Probable
- ☐ Très probable

F1. **Quel type d'abonnement au transport collectif aviez-vous pour le mois d'avril?**

- ☐ Passe pour la session (4 mois) ou passe annuelle
- ☐ Passe mensuelle
- ☐ Passe hebdomadaire
- ☐ Billets individuels sur carte OPUS
- ☐ Aucun

LimeSurvey

F2. **Quel type d'abonnement au transport collectif avez-vous pour le mois de mai?**

- ☐ Passe pour la session d'été (4 mois) ou passe annuelle
- ☐ Passe mensuelle
- ☐ Passe hebdomadaire
- ☐ Billets individuels sur carte OPUS
- ☐ Aucun

F3. **Possédez-vous personellement un vélo FONCTIONNEL que vous utilisez ou pourriez utiliser pour vous rendre à certaines destinations ? (Par exemple, travail, courses, recontres avec des amis, activités, etc.)**

	Oui	Non	Incertain(e)
Vélo régulier	☐	☐	☐
Vélo à assistance électrique	☐	☐	☐

F4. **Avez-vous un cadenas pour verrouiller votre vélo?**

- ☐ Oui
- ☐ Non

F5. **Avez-vous l'intention de vous procurer un vélo pour vous déplacer cet été?**

- ☐ Très improbable
- ☐ Improbable
- ☐ Probable
- ☐ Très probable

LimeSurvey

G1. **La dernière fois que vous vous êtes déplacé.e à Polytechnique, quel mode de transport avez-vous utilisé pour vous y rendre?**

- [ ] Auto comme conducteur
- [ ] Auto comme passager
- [ ] Marche seulement
- [ ] Vélo personnel
- [ ] BIXI
- [ ] Marche + Transport collectif
- [ ] Vélo ou BIXI + Transport collectif
- [ ] Auto + Transport collectif
- [ ] Autre

Autre

G2. **Utilisez-vous parfois d'autres modes de transport pour vous rendre à Polytechnique?**

- [ ] Non
- [ ] Auto comme conducteur
- [ ] Auto comme passager
- [ ] Marche seulement
- [ ] Vélo personnel
- [ ] BIXI
- [ ] Marche + Transport collectif
- [ ] Vélo ou BIXI + Transport collectif
- [ ] Auto + Transport collectif

LimeSurvey

Autre

Autre

H1. Durant les 30 derniers jours, à quelle fréquence avez-vous utilisé les modes de transport suivants pour <u>l'ensemble de vos déplacements</u> (incluant vous rendre à Poly, épicerie, restaurant ou bar, voir des amis ou famille, etc.) ?

	Jamais	Moins d'un jour par semaine	1-2 jours par semaine	3-4 jours par semaine	5 jours ou plus par semaine
Automobile (conducteur ou passager)	☐	☐	☐	☐	☐
Transport en commun	☐	☐	☐	☐	☐
Marche	☐	☐	☐	☐	☐
Vélo (personnel)	☐	☐	☐	☐	☐
Pour nous assurer que vous êtes attentif(ive), veuillez sélectionner «3-4 jours par semaine»	☐	☐	☐	☐	☐
BIXI	☐	☐	☐	☐	☐

I1. Quelle affirmation décrit le mieux votre intention et <u>votre utilisation de l'auto</u> pour vos déplacements en général ?

- Je ne conduis pas ou n'ai pas accès à une auto, je planifie maintenir cette situation dans le futur. ☐
- Je ne conduis pas ou n'ai pas accès à une auto, je prévois utiliser une auto dans le futur. ☐
- J'utilise peu l'auto. J'essaie d'utiliser d'autres modes de transport que l'auto autant que possible. Je maintiendrai ou réduirai mon utilisation de l'auto dans les mois à venir. ☐
- Il m'arrive parfois d'utiliser d'autres modes, mais j'utilise encore principalement l'auto. Mon objectif est de réduire mon utilisation actuelle de l'auto. Je sais quel trajet remplacer et quel mode de transport utiliser, mais je n'ai pas encore commencé à le faire régulièrement. ☐
- J'utilise principalement l'auto, j'envisage de réduire l'utilisation de mon auto, mais je ne sais pas comment ni quand le faire. ☐
- J'utilise principalement l'auto, j'aimerais réduire mon utilisation de l'auto, mais j'ai l'impression que c'est impossible. ☐
- J'utilise principalement l'auto, j'en suis satisfait et je ne vois aucune raison de réduire mon utilisation de l'auto. ☐

LimeSurvey

J1. Laquelle de ces affirmations décrit le mieux votre intention et votre utilisation de la marche pour vos déplacements quotidiens?

- Je fais peu ou pas de déplacements à pied, j'en suis satisfait et je ne vois aucune raison de marcher plus. ☐
- Je fais peu ou pas de déplacements à pied, j'aimerais marcher plus mais je sens que c'est impossible. ☐
- Je fais peu ou pas de déplacement à pied, j'aimerais marcher plus mais je ne sais pas trop comment l'intégrer dans ma vie quotidienne. ☐
- Je fais peu de déplacements à pied, mon objectif est de commencer à en faire plus bientôt. Je sais quels déplacements remplacer, quel itinéraire emprunter, mais je n'ai pas encore commencé à le faire régulièrement. ☐
- Je me déplace souvent à pied, mais je ne suis pas certain(e) de continuer dans le futur. ☐
- Je me déplace souvent à pied, je maintiendrai ou augmenterai les trajets que je fais à pied dans les mois à venir. ☐

J2. Laquelle de ces affirmations décrit le mieux votre intention et votre utilisation des transports en commun pour vos déplacements quotidiens ?

- Je fais peu ou pas de déplacements en transport en commun. J'en suis satisfait et je ne vois aucune raison de l'utiliser plus. ☐
- Je fais peu ou pas de déplacements en transport en commun. J'aimerais l'utiliser plus mais je sens que c'est impossible. ☐
- Je fais peu ou pas de déplacements en transport en commun. J'aimerais l'utiliser plus mais je ne sais pas comment ni quand le faire. ☐
- Je fais peu de déplacements en transport en commun. Mon objectif est de commencer à en faire plus bientôt. Je sais quels déplacements remplacer, quel itinéraire emprunter, mais je n'ai pas encore commencé à le faire régulièrement. ☐
- Je me déplace souvent en transport en commun, mais je ne suis pas certain(e) de continuer dans le futur ☐
- Je me déplace souvent en transport en commun, je maintiendrai ou augmenterai les trajets que je fais en transport en commun dans les mois à venir. ☐

J3. Laquelle de ces affirmations décrit le mieux votre intention et votre utilisation du vélo pour vos déplacements quotidiens?

Dans ce cas, le vélo fait référence à un vélo personnel et à BIXI.

- Je fais peu ou pas de déplacements à vélo, j'en suis satisfait et je ne vois aucune raison d'en faire plus. ☐
- Je fais peu ou pas de déplacements à vélo, j'aimerais en faire plus mais je sens que c'est impossible. ☐
- Je fais peu ou pas de déplacements à vélo, j'aimerais en faire plus mais je ne sais pas comment ni quand le faire. ☐
- Je fais peu de déplacements à vélo. Mon objectif est de commencer à en faire plus bientôt. Je sais quels déplacements remplacer, quel itinéraire emprunter, mais je n'ai pas encore commencé à le faire régulièrement. ☐
- Je me déplace souvent à vélo, mais je ne suis pas certain(e) de continuer dans le futur. ☐
- Je me déplace souvent à vélo, je maintiendrai ou augmenterai les trajets que je fais à vélo dans les mois à venir. ☐

LimeSurvey

K1. **Dans le contexte de la région de Montréal, les modes de transport suivants devraient-ils être plus ou moins soutenus? Veuillez déplacer le curseur pour indiquer votre réponse.**

-10 = Beaucoup moins de soutien

0 = Pas de changement

10 = Beaucoup plus de soutien

Autobus	
Marche	
Rail (métro, train, tram, REM, etc.)	
Vélo	
Voiture privée	

K2. **Pensez-vous qu'il faut accorder plus ou moins d'espace à chacun de ces modes? Veuillez déplacer le curseur pour indiquer votre réponse.**

-10 = Beaucoup moins d'espace

0 = Pas de changement

10 = Beaucoup plus d'espace

Autobus	
Marche	
Rail (métro, train, tram, REM, etc.)	
Vélo	
Voiture privée	

LimeSurvey

K3. **Les modes de transport suivants nécessitent-ils plus ou moins d'infrastructures? Veuillez déplacer le curseur pour indiquer votre réponse.**

-10 = Beaucoup moins d'infrastructures

0 = Pas de changement

10 = Beaucoup plus d'infrastructures

Autobus	
Marche	
Rail (métro, train, tram, REM, etc.)	
Vélo	
Voiture privée	

K4. **Les modes suivants nécessitent-ils un investissement financier plus ou moins important?Veuillez déplacer le curseur pour indiquer votre réponse.**

-10 = Beaucoup moins d'investissements financiers

0 = Pas de changement

10 = Beaucoup plus d'investissements financiers

Autobus	
Marche	
Rail (métro, train, tram, REM, etc.)	
Vélo	
Voiture privée	

LimeSurvey

L1. **Vous rappelez-vous qu'une étudiante soit venue en classe lors de la session d'automne pour vous présenter une séance d'information reliée au présent projet de recherche?**

- ☐ Oui
- ☐ Non
- ☐ Incertain.e

L2. **Quel était le contenu de cette séance d'information?**

- ☐ Les impacts de l'automobile
- ☐ Les bienfaits et les avantages du vélo
- ☐ Les impacts de l'automobile ET les bienfaits et avantages du vélo
- ☐ Je ne me souviens plus
- ☐ Autre

Autre

L3. **En quelques mots, qu'est-ce qui vous avait le plus marqué de cette séance d'information? Qu'avez-vous retenu?**

M1. **Avez-vous déménagé depuis le mois de décembre 2024?**

- ☐ Oui
- ☐ Non

LimeSurvey

N1. Quelle est la situation d'habitation à votre nouvelle adresse?

- [ ] J'habite chez mes parents ou autre membre de ma famille
- [ ] J'habite avec ma/mon partenaire
- [ ] J'habite avec un(e)/des colocataire(s)
- [ ] J'habite seul(e)
- [ ] Autre

Autre

N2. Où se situe votre nouvelle adresse à laquelle vous habitez durant la semaine lorsque vous fréquentez Polytechnique?

- [ ] Sur l'île de Montréal
- [ ] Laval
- [ ] Rive-Sud, Rive-Nord
- [ ] Ailleurs au Québec

N3. Dans quel quartier habitez-vous?

- [ ] Ahuntsic-Cartierville
- [ ] Anjou
- [ ] Baie d'Urfé
- [ ] Beaconsfield
- [ ] Côte-des-Neiges-Notre-Dame-de-Grâce
- [ ] Côte-Saint-Luc
- [ ] Dollard-des-Ormeaux
- [ ] Dorval
- [ ] Hampstead
- [ ] Kirkland

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- L'Île-Bizard-Sainte-Geneviève
- Lachine
- Lasalle
- Le Plateau-Mont-Royal
- Mercier-Hochelaga-Maisonneuve
- Ville de Montréal-Est
- Montréal-Nord
- Montréal-Ouest
- Mont-Royal
- Outremont
- Pierrefonds-Roxboro
- Pointe-Claire
- Rivière-des-Praires-Pointe-aux-Trembles
- Rosemont-La Petite-Patrie
- Sainte-Anne-de-Bellevue
- Saint-Laurent
- Saint-Léonard
- Senneville
- Sud-Ouest
- Verdun
- Ville-Marie
- Villeray-Saint-Michel-Parc-Extension
- Westmount
- Je ne sais pas

N4. **Veuillez préciser la ville dans laquelle vous habitez.**

LimeSurvey

N5. **Veuillez indiquer le code postal de votre nouvelle adresse.**

Je préfère ne pas répondre ☐

Code postal (ex: A1A 1A1) ☐

Code postal (ex: A1A 1A1)

N6. **Si vous avez choisi de ne pas répondre parce que vous préférez ne pas divulguer l'intégralité du code postal à 6 caractères, accepteriez-vous d'indiquer les 3 premiers caractères de votre code postal?**

Les 3 premiers caractères du code postal représentent des zones beaucoup plus vastes que le code postal à 6 caractères.

Je préfère ne pas répondre ☐

3 premiers caractères du code postal (ex: A1A) ☐

3 premiers caractères du code postal (ex: A1A)

O1. **Merci beaucoup d'avoir complété notre enquête!Aimeriez-vous participer au tirage pour gagner l'un des 2 prix, soit des cartes-cadeaux de 200$ chacune?**

Oui ☐

Non ☐

LimeSurvey

O2. **Veuillez fournir votre nom et une adresse courriel valide. Cette information ne sera pas partagée avec qui que ce soit en dehors de l'équipe de recherche et sera uniquement utilisée pour vous contacter si vous gagnez. Le tirage aura lieu au mois de juin 2025.**

Si vous gagnez, vous recevrez un courriel de la part de la chercheuse principale, alessia.vinet@polymtl.ca.

N'oubliez pas de vérifier votre boîte de spam en juin!

Prénom

Nom

Courriel

Merci d'avoir complété notre enquête !

Consent form

Formulaire de consentement

Objectif de l'étude : Nous vous invitons à participer à une activité de recherche qui vise à comprendre les différents comportements de mobilité des étudiants en première année à Polytechnique Montréal.

Équipe de recherche :

- Alessia Vinet, Étudiante à la maîtrise, Département des génies civil, géologique et des mines, Polytechnique Montréal, alessia.vinet@polymtl.ca
- Owen Waygood, Professeur titulaire, Département des génies civil, géologique et des mines, Polytechnique Montréal, owen.waygood@polymtl.ca
- Kevin Manaugh, Professeur associé, Département de géographie et École Bieler de l'environnement, Université McGill, kevin.manaugh@mcgill.ca
- Jérôme Laviolette, Chercheur postdoctoral, Département de géographie, Université McGill, jerome.laviolette@mcgill.ca

Titre du projet: Les comportements de mobilité des étudiants en première année à Polytechnique Montréal

Financement : Fonds recherche du Québec – Nature et technologie (FRQNT) et fonds de recherche en sciences humaines du Canada (CRSH)

Procédure d'enquête : Dans cette enquête, il vous sera demandé des informations géographiques (p. ex. : localisation de votre lieu de résidence ou code postal, lieu le plus fréquemment visité) et des informations sur vos habitudes de transports. Compléter ce sondage prendra **environ 5 minutes** de votre temps.

Participation : Votre participation est volontaire et vous pouvez choisir d'arrêter de répondre à n'importe quel moment du questionnaire. En cas de retrait, vous pouvez demander la destruction des données vous concernant. Cependant, il sera impossible de retirer vos données ou votre matériel des analyses menées une fois ces dernières publiées ou diffusées.

Risques et bénéfices potentiels : Il n'y a pas de risques ni de bénéfices personnels anticipés à votre participation à cette étude. Votre participation ou non à cette étude n'affectera pas les résultats du cours dans lequel vous avez été invité à participer à ce projet.

Compensation : Si vous complétez cette enquête, vous serez admissible au tirage du prix de participation, soit 2 cartes-cadeaux d'une valeur de 200$ chacune.

Confidentialité : L'équipe de recherche recueillera et consignera toutes vos données de manière sécuritaire de façon à en protéger le caractère confidentiel. Seule votre adresse courriel de Polytechnique vous sera demandée pour vous identifier.

Les données collectées grâce à cette enquête pourront être utilisées pour le présent projet de recherche et pourront être présentées, de façon agrégée, dans des publications scientifiques, des rapports et des présentations de recherche.

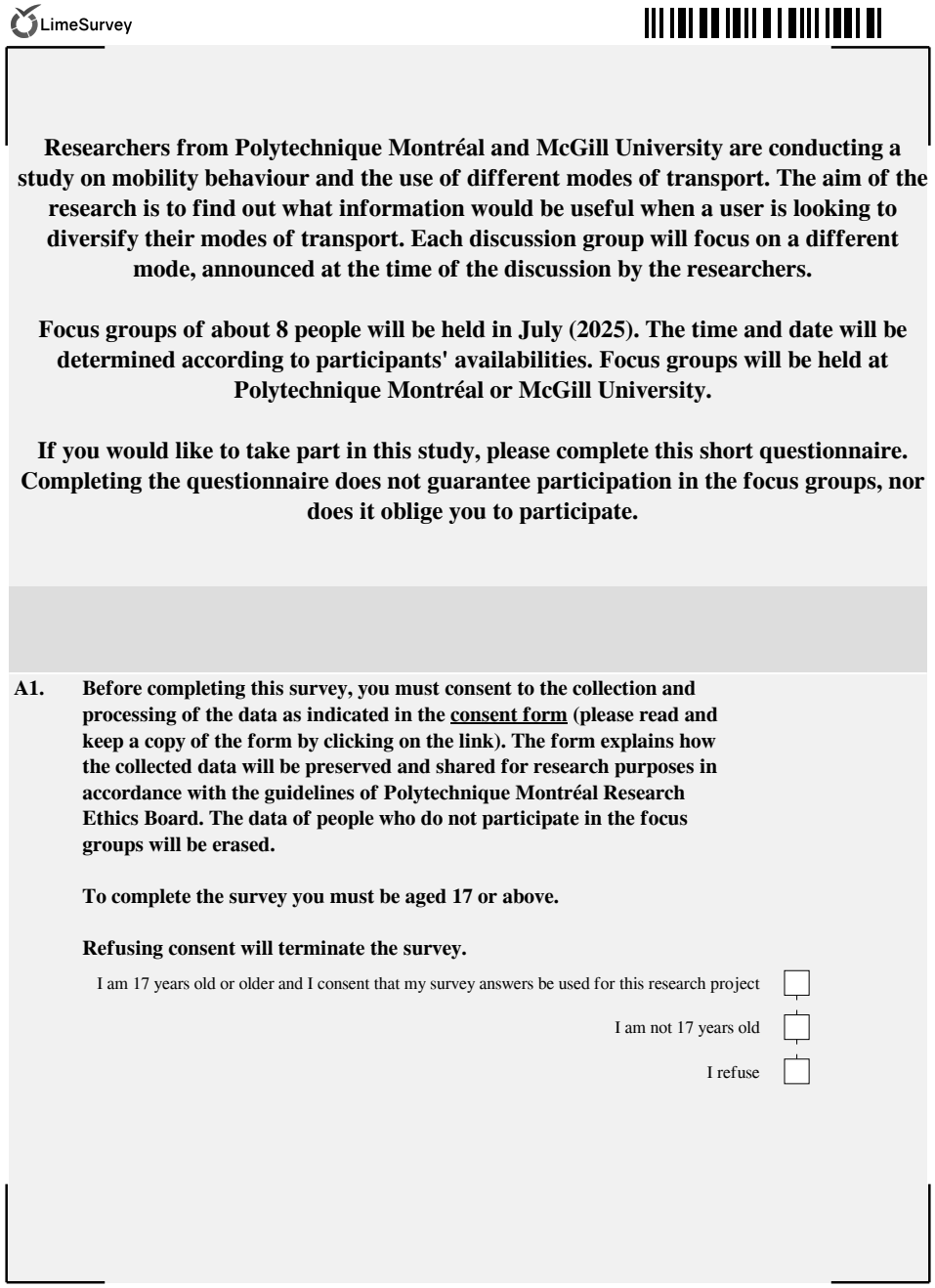
Si vous avez des questions concernant cette étude, s'il vous plait, contactez le chercheur principal, Owen Waygood, par courriel à owen.waygood@polymtl.ca.

Si vous avez des considérations d'ordre éthique ou des plaintes concernant cette étude et si vous souhaitez parler à quelqu'un qui n'est pas dans l'équipe de recherche, vous pouvez contacter la directrice associée du comité d'éthique à la recherche de l'Université McGill au (514)398-6831 ou par courriel à lynda.mcneil@mcgill.ca.

Vous pouvez télécharger une version imprimable (format PDF) de ce formulaire pour préserver dans vos dossiers à des fins de référence.

APPENDIX F FOCUS GROUP RECRUITMENT SURVEY AND ITS CONSENT FORMS

Survey



LimeSurvey

Researchers from Polytechnique Montréal and McGill University are conducting a study on mobility behaviour and the use of different modes of transport. The aim of the research is to find out what information would be useful when a user is looking to diversify their modes of transport. Each discussion group will focus on a different mode, announced at the time of the discussion by the researchers.

Focus groups of about 8 people will be held in July (2025). The time and date will be determined according to participants' availabilities. Focus groups will be held at Polytechnique Montréal or McGill University.

If you would like to take part in this study, please complete this short questionnaire. Completing the questionnaire does not guarantee participation in the focus groups, nor does it oblige you to participate.

A1. **Before completing this survey, you must consent to the collection and processing of the data as indicated in the consent form (please read and keep a copy of the form by clicking on the link). The form explains how the collected data will be preserved and shared for research purposes in accordance with the guidelines of Polytechnique Montréal Research Ethics Board. The data of people who do not participate in the focus groups will be erased.**

To complete the survey you must be aged 17 or above.

Refusing consent will terminate the survey.

- ☐ I am 17 years old or older and I consent that my survey answers be used for this research project
- ☐ I am not 17 years old
- ☐ I refuse

LimeSurvey

B1. Please indicate your age group.

- ☐ Under 17
- ☐ 17 to 29
- ☐ 30 to 44
- ☐ 45 to 59
- ☐ 60 to 75
- ☐ Older than 75

B2. To which gender do you identify?

- ☐ Woman
- ☐ Man
- ☐ Non-binary
- ☐ Other
- ☐ Prefer not to answer

LimeSurvey

B3. In which region of Quebec do you live?

- ☐ Montreal
- ☐ Laval
- ☐ Laurentians
- ☐ Lanaudière
- ☐ Montérégie
- ☐ Eastern Townships (Estrie)
- ☐ Capitale-Nationale
- ☐ Outaouais
- ☐ Centre-du-Québec
- ☐ Mauricie
- ☐ Chaudière-Appalaches
- ☐ Charlevoix
- ☐ Bas-Saint-Laurent
- ☐ Saguenay–Lac-Saint-Jean
- ☐ Abitibi-Témiscamingue
- ☐ Côte-Nord
- ☐ Nord-du-Québec
- ☐ Gaspésie/Îles-de-la-Madeleine
- ☐ I do not live in the province of Québec

B4. Do you have a functional limitation or health issue that prevents you from doing any of the following?

	No	Yes, temporarily	Yes, permanently
Walk more than one block	☐	☐	☐
Biking	☐	☐	☐
Driving a car	☐	☐	☐
Taking the bus	☐	☐	☐
Taking the metro	☐	☐	☐

LimeSurvey

B5. **What makes it impossible for you to ride a bike?**

C1. **Would you be interested and able to attend a 90-minute focus group at Polytechnique Montréal (2500 Chemin de Polytechnique, Montreal) or McGill University (805 Rue Sherbrooke W, Montreal)?**

Participants will receive a small compensation to cover travel costs.

- ☐ Yes, at Polytechnique only (2500 Chemin de Polytechnique, Montreal)
- ☐ Yes, at McGill only (805 Rue Sherbrooke W, Montreal)
- ☐ Yes, at Polytechnique OR at McGill
- ☐ No, I cannot participate in a focus group at these locations

C2. **In general, during the month of July, when would you be available to participate in a focus group at Polytechnique Montreal?**

Select all options that apply.

- ☐ Weekday morning (10 am to 11:30 am)
- ☐ Weekday lunchtime (12 pm to 1:30 pm)
- ☐ Weekday, early afternoon (1:30 pm to 3:00 pm)
- ☐ Weekday afternoon (3:00 pm to 4:30 pm)
- ☐ Weekday, late afternoon (4:30 pm to 6:00 pm)
- ☐ Weekday dinner (6:00 pm to 7:30 pm)
- ☐ Weekday evening (7:30 pm to 9 pm)
- ☐ Weekend morning (10 am to 11:30 am)
- ☐ Weekend lunchtime (12 pm to 1:30 pm)
- ☐ Weekend, early afternoon (1:30 pm to 3:00 pm)
- ☐ Weekend afternoon (3:00 pm to 4:30 pm)
- ☐ Weekend, late afternoon (4:30 pm to 6:00 pm)
- ☐ Weekend dinner (6:00 pm to 7:30 pm)

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Weekend evening (7:30 pm to 9 pm) ☐

C3. Are your availabilities the same for a focus group held at McGill?

Yes ☐

No ☐

C4. In general, during the month of July, when would you be available to participate in a focus group at McGill University?

Select all options that apply.

Weekday morning (10 am to 11:30 am) ☐

Weekday lunchtime (12 pm to 1:30 pm) ☐

Weekday, early afternoon (1:30 pm to 3:00 pm) ☐

Weekday afternoon (3:00 pm to 4:30 pm) ☐

Weekday, late afternoon (4:30 pm to 6:00 pm) ☐

Weekday dinner (6:00 pm to 7:30 pm) ☐

Weekday evening (7:30 pm to 9 pm) ☐

Weekend morning (10 am to 11:30 am) ☐

Weekend lunchtime (12 pm to 1:30 pm) ☐

Weekend, early afternoon (1:30 pm to 3:00 pm) ☐

Weekend afternoon (3:00 pm to 4:30 pm) ☐

Weekend, late afternoon (4:30 pm to 6:00 pm) ☐

Weekend dinner (6:00 pm to 7:30 pm) ☐

Weekend evening (7:30 pm to 9 pm) ☐

D1. Please indicate your language preferences for the discussion group.

I can participate in a focus group in French OR in English; ☐

I can participate in a focus group in French only ☐

I can participate in a focus group in English only ☐

I am not sufficiently fluent in French NOR in English to participate in a focus group ☐

LimeSurvey

E1. **In order for us to contact you for the focus groups, please enter your first and last name (e.g. Marie Tremblay).**

E2. **How would you prefer to be contacted?**

You can chose more than one option to maximize our chances of reaching you.

- [ ] By email
- [ ] By phone call
- [ ] By text message

E3. **Please enter your email address.**

E4. **Please enter your phone number.**

E5. **Please enter the following information so we can contact you for the focus groups.**

You can chose more than one option to maximize our chances of reaching you.

- [ ] Email address

Comment

- [ ] Phone number

Comment

LimeSurvey

In order to best place you in a focus group, we need some additional information.

F1. **Typically, during the summer (May to September, excluding vacations), how often do you use the following modes of transport to get to destinations?**

Destination such as work, school, activities, shopping, picking-up/dropping off children, visiting friends, etc.

DO NOT include walking your dog or walking/biking only done for exercise without a specific destination.

	Never during the summer	A few times, but less than weekly	1-2 days per week	3-4 days per week	5 or more days per week
Walking	☐	☐	☐	☐	☐
Car	☐	☐	☐	☐	☐
Public transit	☐	☐	☐	☐	☐
Cycling (personnal bike, Bixi, Ebike)	☐	☐	☐	☐	☐

G1. **Considering your current level of WALKING as a means to reach your destinations, which of the statements best describes your intentions?**

- ☐ I wish to walk less, I plan on doing so in the future
- ☐ I wish to walk less, but I feel it is impossible
- ☐ I am satisfied and will not change my situation
- ☐ I wish to walk more, but I feel it is impossible
- ☐ I wish to walk more, I will start doing so in the future

G2. **Considering your current level of WALKING as a means to reach your destinations, which of the statements best describes your intentions?**

- ☐ I am satisfied and will not change my situation
- ☐ I wish to walk more, but I feel it is impossible
- ☐ I wish to walk more, I will start doing so in the future

LimeSurvey

G3. **Considering your current use of the CAR as a means to reach to your destinations, which of these statements best describes your intentions?**

- ☐ I wish to use it less, I plan on doing so in the future
- ☐ I wish to use it less, but I feel it is impossible
- ☐ I am satisfied and will not change my situation
- ☐ I wish to use it more, but I feel it is impossible
- ☐ I wish to use it more, I will start doing so in the future

G4. **Considering your current use of the CAR as a means to reach to your destinations, which of these statements best describes your intentions?**

- ☐ I am satisfied and will not change my situation
- ☐ I wish to use it more, but I feel it is impossible
- ☐ I wish to use it more, I will start doing so in the future

G5. **Considering your current use of PUBLIC TRANSIT as a means to reach to your destinations, which of these statements best describes your intentions?**

- ☐ I wish to use it less, I plan on doing so in the future
- ☐ I wish to use it less, but I feel it is impossible
- ☐ I am satisfied and will not change my situation
- ☐ I wish to use it more, but I feel it is impossible
- ☐ I wish to use it more, I will start doing so in the future

G6. **Considering your current use of PUBLIC TRANSIT as a means to reach to your destinations, which of these statements best describes your intentions?**

- ☐ I am satisfied and will not change my situation
- ☐ I wish to use it more, but I feel it is impossible
- ☐ I wish to use it more, I will start doing so in the future

LimeSurvey

G7. **Considering your current level of CYCLING as a means to reach to your destinations, which of these statements best describes your intentions?**

- ☐ I wish to cycle less, I plan on doing so in the future
- ☐ I wish to cycle less, but I feel it is impossible
- ☐ I am satisfied and will not change my situation
- ☐ I wish to cycle more, but I feel it is impossible
- ☐ I wish to cycle more, I will start doing so in the future

G8. **Considering your current level of CYCLING as a means to reach to your destinations, which of these statements best describes your intentions?**

- ☐ I am satisfied and will not change my situation
- ☐ I wish to cycle more, but I feel it is impossible
- ☐ I wish to cycle more, I will start doing so in the future

H1. **What is the total annual income (before taxes) of your entire household?**

NOTE: Please include all sources of income, such as employment, investments, real estate, and any other sources.

- ☐ $0 to $9,999
- ☐ $10,000 to $19,999
- ☐ $20,000 to $39,999
- ☐ $40,000 to $59,999
- ☐ $60,000 to $79,999
- ☐ $80,000 to $99,999
- ☐ $100,000 to $124,999
- ☐ $125,000 to $149,999
- ☐ $150,000 to $199,999
- ☐ $200,000 and over
- ☐ I don't know
- ☐ Prefer not to answer

LimeSurvey

H2. **What is the highest level of education you have achieved?**

- [ ] Elementary school
- [ ] High school (or equivalent)
- [ ] College (Cegep)
- [ ] Professional studies (DEP), trade school or equivalent
- [ ] University, undergraduate (bachelor or certificate)
- [ ] University, master's (or other non-PhD graduate diploma)
- [ ] University, doctorate
- [ ] I prefer not to answer
- [ ] Other

Other

H3. **What is your postal code? If you have more than one place of residence, indicate the one where you spend most of your time.**

Why do we need this? Your postal code allows us to define the type of urban environment you live in. This is important for our analyses by helping us better understand your transport choices. Your data will remain strictly confidential in accordance with Polytechnique research ethics guidelines.

- [ ] I prefer not to answer
- [ ] Example: H3A 0G4 or H3A0G4

Example: H3A 0G4 or H3A0G4

LimeSurvey

H4. **If you selected 'prefer not to answer' because you prefer not to disclose the entire 6 digit code, would you be willing to share the first 3 digits of your postal code?**

The first 3 digits of the postal code represent much larger areas than the 6 digit postal code.

I prefer not to answer ☐

Please enter the first three digits of your postal code. Example: H3A ☐

Please enter the first three digits of your postal code. Example: H3A

Thank you for completing our survey! If you are selected to participate in the focus groups, we will contact you in the coming weeks.

Consent form - Recruitment survey

Information and consent form

Recruitment questionnaire

Title of research activity: Information linked to mobility choices

Research team

- **Research activity director:** Owen Waygood, Professor, Polytechnique Montréal – Department of civil, geological, and mining engineering, owen.waygood@polymtl.ca
- **Co-director:** Kevin Manaugh, Associate professor, McGill University – Department of geography & Bieler school of environment, kevin.manaugh@mcgill.ca
- **Co-director:** Jérôme Laviolette, Post-doctoral researcher, McGill University - Department of geography, jerome.laviolette@mcgilll.ca
- **Researcher:** Alessia Vinet, Student, Polytechnique Montréal - Department of civil, geological, and mining engineering, alessia.vinet@polymtl.ca

Conflicts of interest: The research team is not in a situation of conflict of interest in the context of the present research activity.

Research activity funding: This research activity is funded by MITACS and Vélo Québec.

Preamble: With this recruitment questionnaire, we are inviting you to take part in a research activity aimed at understanding the various types of information that people may use to justify different choices of means of transport. The information revealed in the recruitment questionnaire will not be used for research purposes, only to identify participants.

However, before completing the recruitment questionnaire and accepting this information and consent form, please take the time to read the information presented.

General presentation of the research project: The main objective of the research project is to understand how to provide information that can influence the choice of means of transport for travel.

To achieve our objectives, we have carried out a literature review and will now organize focus groups to discuss in depth the types of information that have an impact on the choice of means of transport and their use.

Inclusion and exclusion criteria: For this research project, we are recruiting participants with the following characteristics:

1) Between 17 and 75 years of age;

2) Have no functional limitations regarding the means of transport that will be discussed in the focus group.

Nature and duration of your participation in the research activity: If you participate in the focus group, you will be asked what type of information you consider when choosing your mode of travel. You may be asked about modes of transport you don't currently use, and what information you would need to use them.

An audiovisual recording of the discussions will be made to ensure the accuracy of the information being analysed.

Focus groups will be held in person at Polytechnique Montréal or McGill University, depending on participants' availability.

In total, participation in this focus group will take 90 minutes.

Risks that may arise from your participation in the research activity: The present activity should not entail any risks greater than those you encounter in your everyday life.

Possible inconveniences arising from your participation in the research activity: No inconveniences are anticipated, apart from the time associated with the focus group.

Potential benefits of participating in the research activity: There are no direct personal benefits associated with this research.

Financial compensation: There is no financial compensation associated with this survey.

Voluntary participation and possibility of withdrawal: Your participation in this research activity is voluntary. You are therefore free to refuse to participate, and may decide to withdraw at any time without having to justify your decision or risk any prejudice. All you have to do is inform the research team's contact person, simply by giving verbal notice.

Please note that it will be impossible to remove your data from the focus group due to the interactions between participants.

Throughout the research process, you will receive timely information relevant to your participation.

The research team and the research ethics committee reserve the right to withdraw you from the study if you fail to comply with the instructions, if there are administrative reasons to abandon the activity, or for any other reasons concerning the feasibility of the study. Should

such a situation arise, the research team will inform you as soon as possible.

Confidentiality and protection of your data: The research team will collect and record all your data in a secure manner to protect its confidentiality.

You have the right to consult your research file to verify the accuracy of the information collected for as long as the research team or Polytechnique Montréal holds this information. However, in order to preserve the scientific integrity of the research project, certain information will be accessible only at the end of the research project.

Dissemination of research results: If you wish to be kept informed of research results, you can provide your e-mail address to the principal investigator at owen.waygood@polymtl.ca.

Indemnity in the event of prejudice and rights of participants: Should you suffer any prejudice whatsoever as a result of your participation in this research activity, you do not waive any of your rights, nor do you release the researchers, the funding organization or Polytechnique Montréal from their legal and professional responsibilities.

Who to contact: If you have any questions about the **scientific aspects** of the research project, or if you wish to **withdraw from the study**, you can contact OWEN WAYGOOD at (514) 340-4711, ext. 2738, or by email at owen.waygood@polymtl.ca.

If you have any concerns about your rights or the research team's responsibilities regarding your participation in this project, you can contact Polytechnique Montréal's Research Ethics Board at (514) 340-4711, ext. 4420 or by email at ethique@polymtl.ca.

Consent form - Focus groups

Information and consent form

Focus groups

Title of research activity: Information linked to mobility choices

Research team

- **Research activity director:** Owen Waygood, Professor, Polytechnique Montréal – Department of civil, geological, and mining engineering, owen.waygood@polymtl.ca
- **Co-director:** Kevin Manaugh, Associate professor, McGill University – Department of geography & Bieler school of environment, kevin.manaugh@mcgill.ca
- **Co-director:** Jérôme Laviolette, Post-doctoral researcher, McGill University - Department of geography, jerome.laviolette@mcgilll.ca
- **Researcher:** Alessia Vinet, Student, Polytechnique Montréal - Department of civil, geological, and mining engineering, alessia.vinet@polymtl.ca

Conflicts of interest: The research team is not in a situation of conflict of interest in the context of the present research activity.

Research activity funding: This research activity is funded by MITACS and Vélo Québec.

Preamble: We are inviting you to take part in a research activity aimed at understanding the various types of information that people may use to justify different choices of means of transport.

However, before agreeing to participate in this activity and signing this information and consent form, please take the time to read the information presented.

We encourage you to ask the research leader or any other member of the research team any questions you may have and to ask them to explain any words or information that are unclear. We also encourage you to seek advice from anyone else you would like to consult about your potential participation.

General presentation of the research project: The main objective of the research project is to understand how to provide information that can influence the choice of means of transport for travel.

To achieve our objectives, we have carried out a literature review and will now organize focus groups to discuss in depth the types of information that have an impact on the choice of means of transport and their use.

Inclusion and exclusion criteria: For this research project, we are recruiting participants with the following characteristics:

1) Between 17 and 75 years of age;

2) Have no functional limitations regarding the means of transport that will be discussed in the focus group.

Nature and duration of your participation in the research activity: If you participate in the focus group, you will be asked what type of information you consider when choosing your mode of travel. You may be asked about modes of transport you don't currently use, and what information you would need to use them.

An audiovisual recording of the discussions will be made to ensure the accuracy of the information being analysed.

Focus groups will be held in person at Polytechnique Montréal or McGill University, depending on participants' availability.

In total, participation in this focus group will take 90 minutes.

Risks that may arise from your participation in the research activity: The present activity should not entail any risks greater than those you encounter in your everyday life.

Possible inconveniences arising from your participation in the research activity: No inconveniences are anticipated, apart from the time associated with the focus group.

Potential benefits of participating in the research activity: There are no direct personal benefits associated with this research.

Financial compensation: You will receive a gift card worth $50 for your contribution to the focus group. You will have a choice between grocery stores and major retailers.

Voluntary participation and possibility of withdrawal: Your participation in this research activity is voluntary. You are therefore free to refuse to participate, and may decide to withdraw at any time without having to justify your decision or risk any prejudice. All you have to do is inform the research team's contact person, simply by giving verbal notice.

Please note that it will be impossible to remove your data from the focus group due to the interactions between participants.

Throughout the research process, you will receive timely information relevant to your partic-

ipation. The research team and the research ethics committee reserve the right to withdraw you from the study if you fail to comply with the instructions, if there are administrative reasons to abandon the activity, or for any other reasons concerning the feasibility of the study. Should such a situation arise, the research team will inform you as soon as possible.

Confidentiality and protection of your data: The research team will collect and record all your data in a secure manner to protect its confidentiality.

Here is how we will protect your data **during the collection process:** Only first names will be used during the focus groups. If two participants have the same first name, they will add a number to their name (e.g., Suzanne 1 and Suzanne 2).

In order to preserve the confidentiality of the group discussions, we ask that you act with discretion and not disclose what is discussed during the group sessions to anyone who is not part of the research project.

Here is how we will protect your data **during analysis and transfer between team members:** The information collected during the focus group will be coded so that the researchers working on the data will not know your identity. Only the principal investigator, Owen Waygood, will have access to the names and codes. This information will be stored on the principal investigator's password-protected computer.

Here is how we will protect your data **during publication:** Your name or identity will not appear in published documents (presentations, reports, research articles, etc.).

Finally, here is how we will protect your data **after the research project:** Your data will be stored by the research team for a period of 7 years after the end of the research project on the Polytechnique Montréal server. The data will be destroyed after this period.

You have the right to consult your research file to verify the accuracy of the information collected for as long as the research team or Polytechnique Montréal holds this information. However, in order to preserve the scientific integrity of the research project, certain information will be accessible only at the end of the research project.

Dissemination of research results: If you wish to be kept informed of research results, you can provide your e-mail address to the principal investigator at owen.waygood@polymtl.ca.

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