Assessing Physical Activity, Mental Health, and Stress among International Students at the University of Toronto.

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ABSTRACT

Physical activity is vital for maintaining the health of students on campus. However, there is a lack of research examining International students (IntS) mental and physical activity (PA) needs. The purpose of this study was to examine the relationship between PA and mental health within an acculturation framework; and to explore IntS experiences with PA and mental health. Two studies were used to address the aims of this study. In study one, secondary data from domestic (n = 4035) and IntS (n = 605) were analyzed. PA mediated the association between stress and mental health but it did not mediate the association between stress and mental illness. In study two, interviews were conducted with 12 IntS, and analyzed using thematic analysis. Results indicate that IntS are facing several cross-cultural, adaptation, and organizational challenges. Higher institutions must continue to explore IntS needs and barriers in order to support them effectively.

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CHAPTER 1

Introduction

It is well established that transitional periods in life events, such as the transition from high school to college, can be a time of increasing stress for young adults (Taylor, Doane, & Eisenberg, 2014). Youth entering college often must adopt new adult roles, including extra academic and economic responsibilities in addition to the pressure of academic success (Sullivan & Kashubeck-West, 2015). In addition to all these challenges, international students are a subgroup of university students that may be experiencing additional unique barriers and stressors. International students are students who pursue higher education away from their country of origin and have a student visa and do not have a permanent residency in the host country (Canada, 2011). The most popular destinations on record for hosting international students are Australia, Europe and North America (Akhtar & Kröner-Herwig, 2015). In Canada, there has been a consistent increase in enrolment of international students in institutions of higher education (CBIE, 2017). In 2014, there were 336,497 international students registered in post-secondary institutions, representing an 83% increase since 2008, and an increase of 10% over the previous year. Furthermore, international students made up 11% of the postsecondary student population in Canada in the 2012-2013 academic year (CBIE, 2017). The presence of international students in Canada has a significant economic importance. Based on estimates from 2010, fostering international students in Canada has created over 81,000 jobs and generated over $445M in government revenue (Kunin, 2018). In addition, $8B annually is derived from international student expenditures including tuition and living expenses (CBIE, 2017). Furthermore, aside from

contributing to the local economy, international enrolment can also add diversity to the academic setting, and provide opportunities for domestic students and professors to build foreign contacts as well as offering teaching and research support (Li & Zizii, 2017).

While there are many benefits to the Canadian university environment, is also well-documented that international students have unique challenges upon their arrival to their new host country (Bai, 2016; Gao & Guo 2017; Hyun, Quinn, Madon, & Lusting, 2007). International students must cope with the same challenges as domestic students, as well as new and additional stressors due directly to the immigration process (Aubrey, 1991). Studies show international students are more vulnerable to encounter stress resulting from cross-cultural adjustment (Mori, 2000). Such stressors may include: involvement into a new unknown culture, language barrier, adjustment to new academic systems, and being apart from friends and family (Wilton & Constantine, 2003). Given these general stressors, a prominent area of research focused on international students has been focused on acculturation and acculturative stress (Aubrey, 1991; Hyun et al., 2007; Sullivan & Kashubeck-West, 2015). Acculturation is the process of cultural, psychological and social change that stems from direct and repeated contact between two or more different cultures (Redfield, Linton, & Herskovits, 1936). The acculturation process can lead to acculturative stress, which is the psychological and physical impact experienced when adapting to a new cultural environment. Acculturative stress has been linked to serious psychological outcomes in individuals such as: feeling ostracized and alone, identity confusion, and lowered mental health status (with a greater emphasis on anxiety, depression, and confusion) (Lee, Koeske & Sales, 2014). In addition, cultural adjustment challenges experienced by some international students, such as entering to a new environment and adjusting to that

environment, can lead to the development of mental health symptoms, including: depression, anxiety, and social alienation (Wilton & Constantine, 2003). Furthermore, the sudden weakening or loss of social support networks and continuous excessive stress experienced simultaneously can increase the likelihood of developing psychological distress (Mori, 2000). This is concerning, since the majority of mental illnesses present with first episodes by age 24 - the typical age range of university students (Kessler et al., 2005). Mental health early in life is correlated with academic and occupational difficulties and adverse health and social outcomes (Eisenberg, Downs, Ezra , & Zivin, 2009). Given that international students are a sub-group of university students who may be at risk for mental health symptoms, it is important to understand strategies to mitigate the risks.

It is well-documented that physical activity can improve psychological and physiological health and well-being (Callaghan, 2004). Physical activity can improve mental health by reducing anxiety, depression, and negative mood, as well as improving cognitive function and self-esteem (Wipfli, Landers, Nagoshi, & Ringenbach, 2011). Moreover, regular physical activity has been found to decrease symptoms of low self-esteem and social withdrawal (Sharma, Madaan, & Petty, 2006). Consistent empirical support towards the benefits of physical activity on mental health have resulted on it being the proposed strategy for international students to cope with symptoms of acculturative stress (Li & Zizzi, 2017). To date, most of the studies examining physical activity on acculturative groups have focused on recent immigrants, refugees, and native groups. There is currently limited research on how international students are engaging in physical activity in post-secondary institutions (Gerber, Barker, & Puhse, 2012). Even though there are many similarities between international students and other acculturative groups, it is important

to recognize that international students have specific and unique characteristics. The University of Toronto has developed a long-term strategic plan towards the year 2030 with the goal of continuing with the trends of academic excellence and institutional success. The University of Toronto's president Meric Gertler presented three strategic priorities to confirm the institution's commitment to achieve the 2030 objectives (Gertler, 2015). One of the three strategic priorities is to strengthen international partnerships. More specifically, the University of Toronto has as target goal for international students: to make up 21% of the undergraduate population by the year 2021 (Office, 2017). The enrolment of international students at the University of Toronto has increased steadily in recent years. In 2016-17, there were 17,452 international full-time students enrolled, which accounted for 19.7% of the total enrolment. In the year, 2017-18 international students made up 20.5% of the undergraduate population and 16.5% of the graduate population. There is a need to study students' engagement in physical activity and mental health resources on campus as a result of the new central role given to internationalization by the University of Toronto and other educational institutions. Therefore, the objective of this thesis project is to describe international students' patterns of engagement in physical activity and mental health activities at the University of Toronto, to examine the relationship between physical activity and mental health within an acculturation framework, and to explore international students' experiences with physical activity and mental health on campus.

Purpose, Research Questions, and Hypotheses

Assessing and understanding the health needs of higher education students is vital to create a healthy campus and community. As described above, physical activity plays an important role in maintaining the health and well-being of students on campus. International students are important members of the student body at the University of Toronto and there is a lack of empirically validated research examining their mental and physical activity needs.

The purpose of this thesis is to describe international students' patterns of engagement in physical activity and mental health activities at the University of Toronto, to examine the relationship between physical activity and mental health within an acculturation framework, and to explore international students' experiences with physical activity and mental health on campus. This purpose will be addressed in two interrelated but distinct studies.

Based on the current literature regarding other sources of acculturative stress (Berry, Kim, Minde, & Mok, 1987; Crockett et al., 2007; Kuo, 2014; Sam & Berry, 2010), it is hypothesize that international students will report lower levels of physical activity, higher stress, and lower mental health compared to domestic students. I hypothesize that physical activity will be positively associated with mental health.

CHAPTER 2

Literature Review

According to a recent report, the number of international students enrolled in post-secondary institutions in Canada, increased 130 percent from 180,000 students in 2007 to 415,000 to 2016 (RBC, 2017). Moreover, universities in Canada continue to commit to internationalization as part of their strategic planning and top priorities. In 2014, a survey conducted of 97 public and private universities and university-degree level colleges in Canada, revealed that 96% of Canadian Universities support internationalization and 89% are increasing space on their campuses to allow for more internationalization (Univcan, 2018).

Regardless of the efforts from multiple post-secondary institutions to increase internationalization efforts, multiple studies consistently report that international students are facing several difficulties and barriers to adapt successfully to their new environment (Guo & Guo, 2017). Physical activity has been shown to provide multiple physiological and mental health benefits and previous authors have suggested that physical activity could be a potential tool to aid international students in their adaptation (Li & Zizii, 2017). Therefore, the objectives of this study is to explore the levels of physical activity and mental health on international students at the University of Toronto, as well as to examine the relationship between acculturative stress and physical activity and mental health levels of international students. In this chapter, I outlined previous research on international student's physical activity, mental health, physical activity barriers of participation and acculturation research to provide a context for the essential needs

of this population. This will in turn provide more consideration and resources to international student's adaptation at the post-secondary institutions.

Internationalization

Internationalization has become a top priority for Canadian universities. Guo and Guo (2017) reported that in 2014, 82% of Canadian universities recognize internationalization as part of their strategic plan and among their top priorities. Knight (2004) defines Internationalization as: "the process of integrating an international, intercultural or global dimension into the purpose, functions or delivery of post-secondary education. (p. 2). Furthermore, internationalization can be differentiated as either "symbolic" or "transformative". A symbolic approach to internationalization refers to international students being active players in the education market place primarily due to the revenue generated from them. For example, in Canada, the desire to increase higher education opportunities for International students is driven by multiple factors, yet one of the primary benefits is financial gain (Knight, 2000). Revenue from international students' expenses such as books, meals, accommodations, and tuition have helped offset the decline in government funding to higher education institutions. In 2012, international students generated more than $455 million in government tax revenue (Gao & Guo 2017). At the federal and national level, international students are perceived as potential sources of skilled labor for the Canadian work force and contributors to Canada's competitive edge at the national and global environment (Kenyon, Frohard-Dourlent, & Roth, 2012).

Internationalization from a "transformative" approach focuses on the transfer of knowledge and sharing, and the integration of international students to research, knowledge creation, teaching,

and functioning academic institutions (Schweisfurth & Gu, 2009). For example, the University of British Columbia increased their recruitment and enrollment of international students in 1996 as a response to the British Columbia government tuition freeze. International students aided to deal with the university expenses and helped cover the cost of delivering undergraduate education to domestic students (Kenyon et al., 2012). At the academic level, international students contribute to academia by producing and disseminating knowledge in Canadian universities and worldwide; as well as creating diversity on campus, promoting intercultural learning, and indorsing foreign policy interests (Li & Zizii, 2017; Snow 2006). However, with the intensification of international enrollment intake, post-secondary institutions increase the risk of vulnerability to unexpected changes in events, generated by financial or economical shifts or by unforeseen events. Furthermore, international students might need specific support to be in place to achieve an adequate adaptation and academic success (Gertler, 2018).

Internationalization Implications

As many careers and the job market develop into global markets, there has been an increased obligation for institutions of higher education to prepare their students to work along with other cultures and function effectively in such work environment. For universities, international students represent the institutions' pride and commitment to functioning at an international level (Kenyon et al., 2012) . It has been reported that a great number of higher education institutions maintain competition against other universities by creating incentives to attract more international students. For example, the University of Toronto announced in January of 2018, that they would reduce PhD international student fees starting in September 2018. PhD international students will be paying the same tuition fee as domestic students; a significant

decrease in tuition which can come up to three times more than that of domestic students. The goal of this tuition cost control is to attract more outstanding students from across the globe (McKeen, 2018). Furthermore, in a discussion paper released by the University of Toronto in 2015 by the University's president Dr. Meric Gertler, there are three recognized priorities for the University of Toronto and one of them is to strengthen international partnerships and move towards an international strategy. Their objective is to "Position the University of Toronto as a strong research and teaching partner with leading peer institutions around the world, while creating more opportunities for our students to benefit from an internationalized learning experience" (Gertler, 2015). This strategy includes the increase of international partnerships, student mobility, international student recruitment, international presence, and inter-divisional coordination (Gertler, 2018). This portrays the commitment of top Canadian universities to include internationalization as part of their current and future academic vision.

There are further internationalization implications at the Federal level. In Canada, new changes in the skilled worker immigration program award more points towards the permanent residency application of those applicants who have completed their studies at a Canadian post-secondary institution (Canada, 2017). It is estimated that the alteration of the worker immigration program policy will attract more international students to Canada. This would occur because international students are more likely to stay in the country where they achieved their university credentials (Aslanbeigui & Montecinos, 1998) and foreigners with domestic credentials typically face fewer barriers to integrate themselves to the work force than individuals with foreign credentials (Houle & Lahouaria, 2010).

Acculturation

Despite the integration of international students in university and college life, it is well reported that they experience a number of challenges upon arrival to their new host countries. These challenges include: isolation, alienation, marginalization, low self-esteem, mental health concerns, academic difficulty, racial/ethnic discrimination, loss of social support, and homesickness (Gao & Guo 2017; Mori, 2000; Yeh & Inose, 2003). In recent years, models which were originally designed to study immigration and refugee issues more generally have been adapted and applied to the investigation of acculturation among international students (Jaworska, De Somma, Fonseka, Heck, & MacQueen, 2016; Smith & Khawaja, 2011). Acculturation is defined as the process of cultural, psychological, and social change that stems from direct and repeated contact between two or more different cultures (Redfield et al., 1936). The main idea from acculturation assumes that an individual can distinguish, practice, and identify with two or more different cultures autonomously of one other. When two cultures come in direct contact with each other, acculturative individuals and groups bring their own culture and psychological potentials to the new culture (Berry, 2005). Each of the cultures can have positive or negative valence, which represents and individual's attitude, behaviors, preferences, and representing the existence or absence of cultural behaviors, such as language use, type of food, type of clothing, etc (Berry, 1997). The level of compatibility or incompatibility among all these variables and between the two communities can lead the individual to engage in the process of deciding whether to accept or reject a specific culture (Berry, 2003).

The principles of the acculturation model are founded in the psychology theory of stress and coping (Kuo, 2014). From this point of view, acculturation is seen as an unavoidable process in human nature, needed to manage and cope with challenges brought up by the process of migration and the contact of a new environment. Although there are many acculturation models, Berry's framework for understanding acculturation (2003) serves as the foundation for the current work. This framework (see Figure 1) has been considered the most influential work on acculturation (Kuo, 2014). Berry's acculturation framework includes the consideration of acculturation in terms of "group level" and "individual level" effects; in which the acculturation impact can occur both at the group and individual level before or during the acculturation process and can impact the adaptation outcome of the individual (Berry, 2003). At the group level, acculturation is seen as only one aspect of the larger notion of culture change, which takes place due to direct intercultural contact, and is considered to create a change in either one or both groups (Berry, 1997). At the individual level, which is often identified as psychological acculturation, refers to the psychological changes that the individual undergoes as it encounters the new environment, and which eventually leads to adaptation to the environment (Berry, 1974). The behavior changes can be minor such as eating different food and dressing differently, all the way to more complex behaviors, which can lead to an increase in stress (Sam & Berry, 2010). The adaptations can be identified as psychological (e.g, self-esteem, well-being) or sociocultural (e.g, acquiring a new language and friends). The framework works under two assumptions, the first one is the disposition of individuals' desire to maintain their home cultures and identities; the second is the degree in which the individuals wish to interact with those who are outside of their perceived group and partake with them on a regular basis (Berry, 1974).

Based on the preferences of the two assumptions, Berry (1997) outlined four acculturative psychological strategies used by immigrants based on their attitudes and behaviors towards acculturation (see Figure 2).

Based on Berry's framework, an immigrant who is using the strategy of assimilation decides to reject their own cultural identity and instead seeks to adopt the new culture (Berry, 2005). Alternatively, an immigrant with the strategy of separation seeks to maintain their own culture identity and avoid interactions with the new culture (Berry, 2005). Furthermore, an immigrant with an integration strategy seeks to maintain their own culture while also adopting or maintaining relationship with the new culture, and an immigrant using a strategy of marginalization renounces to all cultural identities (Berry, 1997). Researchers have highlighted that integration is linked to the most desirable psychological and socio-cultural characteristics of adaptation (Berry & Sam 2006; Liebkind, 2008). In conclusion, the working hypothesis of acculturation research can be summarized as a significant life change that can arise with challenges to the individual. If the life change is qualified or perceived as a stressor for the individual, this might become a stressor and result in stress-related reactions, specially if the individual does not have the appropriate social support and coping strategies (Sam & Berry, 2010). Despite being criticized by Rudmin (2003), acculturation theory continues to represent the dominant acculturation framework and practical model used to help understand the migration transition and intricate challenges that accompany this process (Rudmin, 2003).

Figure 1. A General Framework for Understanding Acculturation. Reproduced from "Conceptual approaches to acculturation," by J.W Berry, 2003.

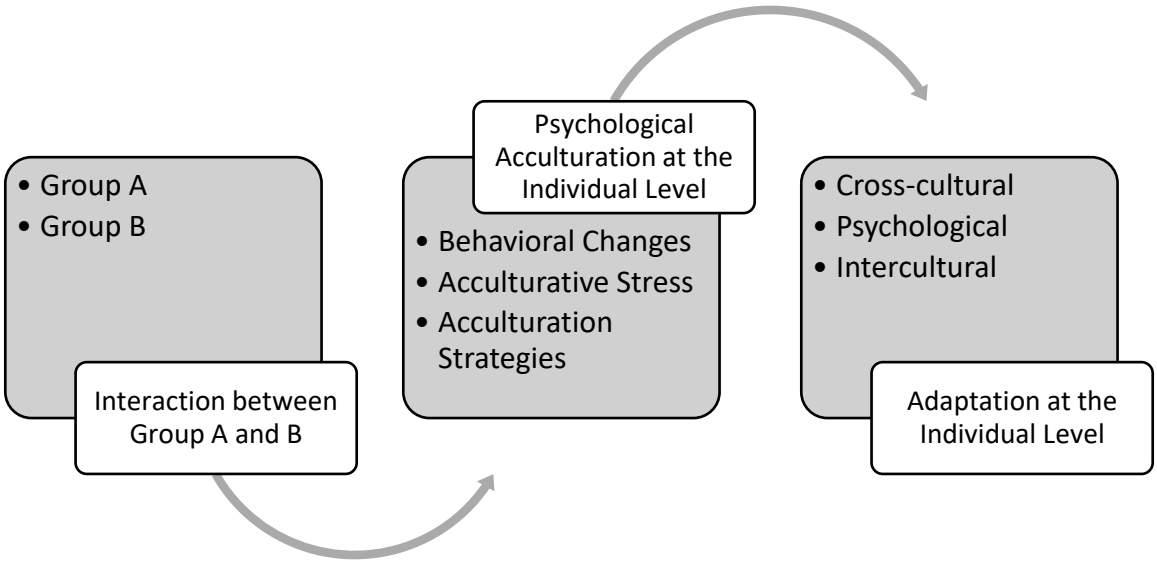
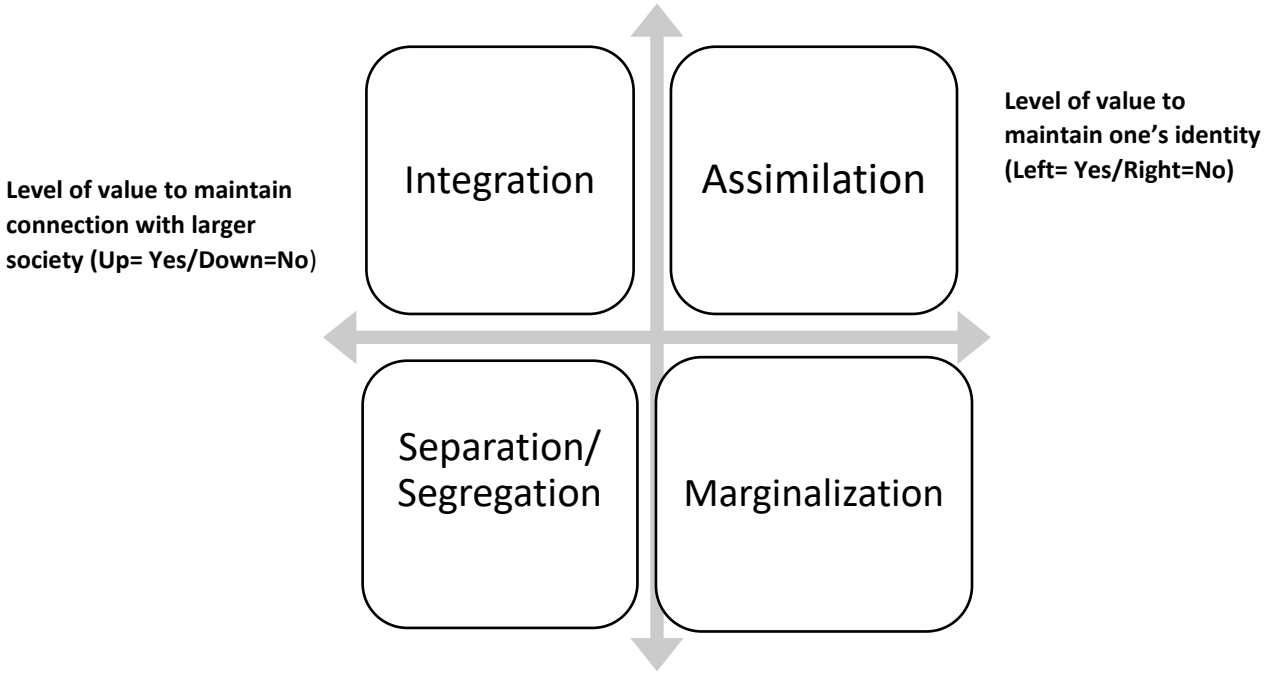


Figure 2. Acculturative Strategies, Reproduced from "Immigration, acculturation, and adaptation." by J.W Berry, 1997.



Acculturative Stress

A common consequence of the acculturation process is the manifestation of acculturative stress. John Berry first proposed the concept of acculturative stress in 1970 as an alternative term for "culture shock". Acculturation stress is the physiological, psychological, and social aspects that are explicitly associated to the acculturation process (Desa, Yusooff, & Abd Kadir, 2012). The degree of acculturative stress experienced by an individual can range from mild stress (gradually improves as the individual adapts to an experience) to an unbearable stress (worsens over time) (Berry et al., 1987). Acculturative stress is normally accompanied by symptoms of anxiety and depression and a decline in physical and psychological health, which may be amplified if the individual does not have a positive support system (Desa et al., 2012; Hovey & Magaña, 2002). The association between acculturation strategies and acculturative stress have been well established in migrants, ethnic minorities, and native people (Sullivan & Kashubeck-West, 2015). For example, individuals with a marginalization psychological strategy tend to have more difficulties adjusting to the new environment and have higher levels of stress comparing to other individuals who use other psychological strategies (Kuo, 2014). Although, international students sometimes have many similarities with other immigrants, refugees, and other acculturating groups, there are also several differences. These include having to adapt rapidly to the host culture and academic style after shortly arriving to campus, arriving to a new environment without a family or social network; also, international students tend to be younger and may have a greater exposure to the new culture by normally having to reside on a university housing (Sullivan & Kashubeck-West, 2015). Lastly, international students recognize that their stay in the host country is short term, and they will have to return their home country after their studies are

over (Sullivan & Kashubeck-West, 2015). The combination of all these characteristics make internationals students diverse from other acculturative groups and therefore in the last few years researches have been attempting to better understand their acculturative process and needs.

International Student's transitioning to College & University

As many students begin their college and university journey, they are also transitioning into early adulthood (Kwan, Cairney, Faulkner, & Pullenayegum, 2012). This transition period is one of the first major transition phases that a person encounters in life. This period is accompanied by a complex process in which youth normally move away from parental support, move away from stablished social networks, financial support, and they need to establish new routines as well as move into a new community with new challenges and responsibilities (Brooks & Dubois, 1995). With respect to international students, they are not only adjusting to a new academic environment but also to a new social and cultural context (Locks, Hurtado, Bowman, & Oseguera , 2008). There has been extensive research on "non-traditional" students (e.g. international students and visible minorities) which reports that they need to feel accepted in order to develop and integrate into the campus environment (Terenzini et al., 1994). Terenzini et al (1994) described validation as the process in which non-traditional students feel empowered, supported, and accepted by the rest of the community; where students received affirmative signals from the rest of the community, so that they feel that they can successfully contribute to their college community and that their contribution is valuable (Terenzini et al., 1994). However, international students' experiences on campus is sometimes questioned (Treloar et al., 2000), with multiple reports that international students often experience exclusion, discrimination, loneliness, alienation and many negative remarks (Lee, 2015). In a 2007 study, Poyrazli and Lopez,

found that when compared with the U.S peers, international students were at a greater risk of experiencing or perceiving discrimination. They also found that students who spent more time living in the U.S suffered from more discrimination. This may indicate that as students pass the initial "honeymoon" state, where all the experiences are exciting, individuals start to experience more negative experiences the longer they remain in the country (Poyrazli & Lopez, 2007). Furthermore, some evidence suggests that the greater the cultural distance between the international student's native country and the host nation, the more adjustments would be needed by the student (Popp, Pierce, & Hums, 2011). For example, in a study conducted by Ridinger & Pastore (2000), studying factors associated with international-student athlete's adjustment to college; results showed, that Canadian students studying in the United States were less likely to have concerns with homesickness and cultural barriers (Ridinger & Pastore, 2016). Canadian culture is more similar to American culture, so there is a smaller culture gap between the two countries, allowing these students to adjust better to the host culture.

Due to these findings, researchers have recommended different strategies to ease the transition of international students including: promote awareness to staff and faculty responsible of students' transitional experiences; educate staff and faculty about the different transition processes existing between "traditional" versus "non-traditional" students; promote early validation for "non-traditional" students, such that students are reassured early that their opinions and ideas are valuable; involve in-and-out of class experiences for international students, since substantial learning takes place outside of the classroom (Terenzini et al., 1994). It does seem that many higher education institutions have adopted many of these strategies

(Young, 2014) but the fact that recent reports continue to demonstrate that international students continue to exhibit transitional challenges (Forbes-Mewett & Sawyer, 2016; Terrazas-Carrillo, Hong & Pace, 2014), may suggest that perhaps not all of these strategies are effective. There are many stressors and challenges that must be carefully explored within the international student population.

Acculturative Stress

The literature offers a number of predictors of acculturative stress affecting international students, mainly: language proficiency, educational stressors and sociocultural stressors (Khawaja & Dempsey, 2007). Language proficiency is found to be a strong predictor of psychological and sociocultural adjustment (Smith & Khawaja, 2011) since distress related to language barriers appears to be the most challenging issue for the vast majority of international students (Yeh & Inose, 2003). Lack of language skills can affect students' academic performances and hinder them socially by not being able to interact with domestic students effectively (Hayes & Lin, 1994). This is an important observation, since it has been reported that numerous post-secondary institutions may have decreased their English proficiency requirements in order to increase their internationalization efforts; a strategy which intended to attract more students but which may be a disadvantage to the students' adaptation (Coley, 1999).

Domestic and international students alike can encounter academic stress in higher education; however, it has been reported that the stress experienced by international students can be intensified due to anxiety of adapting to a new educational environment (Mori, 2000). The academic stress may be in part due to international students' discrepancies in their academic

expectations and the reality of higher education (Chen 1993). For example, Chen (1993) reported that international students experience pressure from their families and themselves to do well academically in the new country; but their academic performance is often below their expectations due to the adaptation to a newer language, culture, teaching style, and social environment. Students who are not able to overcome these challenges early on might experience inadequacies and lack of confidence navigating their new environment moving forward. In addition, international students have reported feeling disappointed about the quality of services offered by educational institutions; and Khawaja & Dempsey (2007) found that this group's unmet expectations regarding higher education were linked to lower adaptation as well as increased depression levels.

Moreover, international students normally must form new social networks after leaving friends and families in their home country. The literature in this area shows that personality variables, trait-anxiety, and extroversion might negatively affect international students' ability to form relationships and in-turn sociocultural and psychological adaptation (Smith & Khawaja, 2011). Language challenges, native cultural norms, and the type of friendships they encounter in the new host country, can contribute to feelings of loneliness (Wu, Garza, & Guzman, 2015). For example, international students coming from collectivistic cultural backgrounds may feel confused when dealing with domestic students with more individualist's values such as independence, confidence, and self-assurance (Newsome & Cooper, 2016). Many international students perceive the social relationship with the new culture as a shallower friendship instead of the strong social connections that they had formed back home (Cross, 1995). It has also been

found that the quality of the social support system had a direct but also buffering effect when international students were experiencing psychological stress (Mallinckrodt & Leong, 1992). The authors concluded that social support, especially coming from the individual's academic program, is indispensable for international students.

Additionally, current research indicates that academic institutions and the social network of students play a vital role in the adjustment of first year students to universities (Hazel, Munro, & Fisher, 2004). Studies have found that students who have a strong social network and participate in extracurricular activities are more likely to graduate (Wilcox, Winn, & Fyvie-Gauld, 2006). For international students, lack of social support has been identified as a strong predictor of potential stress. Social support refers to the delivery of psychological and material resources from others to help the individual cope with stress (Crockett et al., 2007). Rienties, et al. (2011) identified social support of family and friends, social life, ethnic background, and financial support as relevant social integration factors for international students (Rienties, Beausaert, Grohnert, Niemantsverdriet, & Kommers, 2012). In addition, social loss (being away from friends and family), homesickness, loneliness, identity threat, and the stress of developing a new support system has been found to lead to distress in international students (Li & Zizii, 2017). Furthermore, perceived support from school has been found to be a significant predictor of acculturative stress at post-secondary institutions; support from an academic institution not only refers to the concrete support such as inclusive environment and facilities, but also moral support from the other individuals with whom international students interact, such as classmates, professors, academic advisors, and staff members (Bai, 2016). Studies have demonstrated that international students who identified themselves as having low social support reported higher levels of

acculturative stress (Sullivan & Kashubeck-West, 2015). Conversely, having a strong social support network can decrease acculturative stress and can help international students to have a better mental framework (Bai, 2016). International students with a strong social support, have higher possibilities of having a positive acculturative involvement and have a reduced risk of suffering from acculturative stress. For example, in a study done by Wu et al. (2015), interviewing US international students regarding challenges and adjustment to college; one of the participants in the study described their experience in the following manner: "I feel that there is no opportunity for me to interact with my classmates except in one or two classes. I came to study by myself, and I don't have relatives in the U.S. For my classmates, we all meet few times a week, but we did not talk about many personal things. They have their own friends and family. Usually, they disappear after class (Liu, China)" (Wu et al., 2015). In a study by Robertson, et al. (2010) surveying academic staff about their experiences with international students, results showed that staff were not empathetic with international students' language skills, who were highly criticized by their academic advancement and lack of critical thinking in the classroom (Robertson, Line, Jones, & Thomas, 2000).

Due to these challenges, many international students are more likely to build relationships with other international students instead of building relationships with domestic students (Schartner, 2015). These is an interesting point, as the literature suggests that international students who can create friendships and connections with domestic students, experience less acculturative stress symptoms(Poyrazli, Kavanaugh, Baker, & Al-Timimi, 2004). In addition, the ability to

manage a social life outside of academics (e.g sport clubs, student associations) has also a strong influence on their academic performance (Rienties et al., 2012).

These findings are extremely relevant, since it has been reported that good social support leads to higher well-being and even having a "buffering" effect to stress. Specifically, it has been found that individuals undergoing high stress but high social support might still have greater health than individuals undergoing lower levels of stress with low social support (Reifman & Dunkel-Schetter, 1990). It has also been established that a lack of social support is associated with suicide in college students, further establishing the importance of this variable (Hollingsworth et al., 2017). In response to these challenges numerous universities are trying to support international student's adaptation process by creating international student centers and providing counselors and advisors who can help students with adaptation problems (Lacina, 2002). Unfortunately, it is well reported that international students tend to underutilize these services (Mori, 2000).

Mental Health & International Students

Psychiatric disorders are common in adolescents and youth, having negative consequences in well-being, academic performance, and social development (Cash & Bridge, 2009). Concern and attention to the mental health of post-secondary students has increased in recent years (Martin, 2010). This is due to research data presenting that three quarters of those individuals who develop mental health disorders do so between the ages of 16 to 25, the same age in which most young people pursue higher education (Martin, 2010). The Ontario College of Health Association reported that post-secondary students are twice as likely to report mental illness symptoms and elevated distress than non-university peers (OUCHA, 2017). In the United States, data from the

American College Health Assessment (2015), found depression to be ranked fourth and anxiety sixth in the health problems that university students experienced (Soet & Sevig, 2006). This is concerning since poor mental health is associated with an elevated risk of dropping out of university (Taylor et al., 2014).

While the role of post-secondary institutions is not to provide psychiatric interventions, the majority of universities strive to create a mental health strategies and use preventative initiatives to reduce stress and help students (Jaworska et al., 2016). Post-secondary institutions attempt to attain this by promoting social support, encouraging self-care, and gate-keeper training (i.e identify distressed students and referring to appropriate resources). Concurrently, there is evidence of the positive effect of university counselling services to students; results have shown clinically significant changes in students experiencing distress (Murray, McKenzie, Murray, & Richelieu, 2016). In addition, university counselling services to students have rendered effective by showing improvements with problems related to anxiety, depression, tendency to withdraw themselves, and improvement in students' overall psychological functioning as well as ability to progress with their academic demands (Biasi, Patrizi, Mosca, & De Vicenzo, 2017). Given these challenges, international students may be more vulnerable to mental health illnesses when compared to domestic students. This may be due to acculturative stress; therefore international students may be in greater need to access mental health services and support on campus.

Mental Health Resources

Student counselling services are a potential positive resource for international students dealing with acculturative stress. Unfortunately, there is strong evidence to show that international

students underutilize these services on campus. In a study by Nilsson, et al. (2004) examining pressing concerns of international students, the authors found that only 2% of students sought counselling services and from those students a third dropped out after the initial session (Nilsson, Berkel, Flores, & Lucas, 2004). In another study by Hyun, et al. (2007) on the use of counseling services among international graduate students, 44% of international graduate students reported emotional or stress-related problems that significantly affected their health or academic performance. From those students only 17% reported using counselling services either on or off campus; this number is significantly lower compared to domestic graduate students (36%) (Hyun et al., 2007). Other researchers have found that when international students do decide to seek mental-health assistance; they normally suspend the care prematurely compare with domestic students (Pedersen, 1991). Several factors seem to be thwarting the utilization of mental health resources on campus for international students, but the most common causes are: 1) lack of awareness, 2) different health-related cultural beliefs and practices (this is particularly strong for students who rely on non-western approaches to health care), 3) a strong cultural stigma associated with emotional expression, and 4) feeling the issues they are undergoing are not "severe" enough (Aubrey, 1991; Akhtar & Kröner-Herwig, 2015; Hyun, et al., 2007; Nilsson et al., 2004; Storrie, Ahern, & Tuckett, 2010). Moreover, Nilsson et al. (2004) also suggested that the cultural capability of the counselors could also impact international student's utilization of services. Whereas counselor's sensitivity and awareness towards international students' cultural background might affect the students' intentions to seek support or return to counselling after the initial meeting.

In an acculturation review completed by Smith & Khawaja (2011), the authors brought forward the possibility that the underutilization of mental health resources by international students might be due to the universities adoption and assimilation attitude; in where universities expect international students to use the same services that are culturally accepted for domestic students but may not be culturally adequate for all (Smith & Khawaja, 2011). Given the importance that coping mechanisms hold in determining whether a stressor becomes acculturative stress, it is important to acknowledge the fact that post-secondary institutions have a crucial role in helping international students' adaptation. Nonetheless, little is known about the general awareness of mental health resources on campuses and this is a key focus in the current work.

Students seek university campus mental health services to manage and cope with their stressors (acculturative and more general) (Mori, 2000). While these services are beneficial, the wait times to see a counsellor are long and extending. As such, other strategies to address mental health concerns are needed. Given the well-documented benefits of physical activity on mental health, this may be a strategy directed at international students (Anderson & Geetha, 2013). However, little is known about the physical activity levels of international students and how physical activity is related to mental health in this population.

Physical Activity

Physical Activity (PA) is defined by the World Health Organization (WHO) as "any bodily movement produced by the skeletal muscles that requires energy expenditure' (WHO, p 1); although exercise is often used interchangeably with PA, exercise is a subset of PA, and is defined as: "planned, structured, repetitive, and purposive in the sense that improvement of

maintenance of one or more components of physical fitness is an objective"(Caspersen, Powell, & Christenson, 1985). Physical activity has gained renowned interest in recent years and has become a panacea of many health concerns as is as a low cost- high reward intervention. In a systematic review by Reiner et.al (2013), researchers concluded that physical activity appears to be an important and effective factor for decreasing weigh gain, obesity, cardiovascular disease, type 2 diabetes, the risk of weight gain, and age-related diseases (dementia and Alzheimer's disease) (Reiner, Niermann, Jekauc, & Woll 2013).

With regards to mental health, research has shown that physical activity is an effective tool to reduce anxiety and various indices of stress in adults , in addition to providing protective mechanisms against stress-associated mental disorders (Nguyen-Michel, Unger, Hamilton, & Spruijt-Metz, 2006; Strohle, 2009). Physical activity has also been shown to be effective in decreasing depression, negative moods, and improving self-confidence and self-esteem (Callaghan, 2004; Deslandes et al., 2008). Multiple researchers have identified neurobiological influences, psychological characteristics, and social factors as possible mechanisms that links physical activity and mental health (Anderson & Geetha, 2013; Jewett et al., 2014). Table 1 presents the most popular mechanisms and roles that physical activity has on mental health (see table 1).

Table 1. Potential Physiological & Psychological Mechanisms linking physical activity and stress and mental health.

	Mechanism	**Description:**	**Role of Physical Activity**
Physiological Mechanisms	Hyphothalamic-Pituitary-Adrenal (HPA) Axis	The HPA axis works in conjunction with the sympathetic system to connect the brain with the periphery of the body. One of the HPA axis main roles is to regulate the body's response to stressors that disrupts balance to the organism (Papadimitriou & Priftis, 2009).	Dysregulations in the HPA axis play a role in the development of stressors. Preliminary research has shown that physical activity induces changes in the HPA axis and modulates stress and anxiety reactivity in humans (Anderson & Geetha, 2013).
	Monoamine System	The monoamine system refers to the neurotransmitters dopamine, noradrenaline and serotonin. Dysfunctions in the monoamine system in the brain have implications in the pathology of mental health disorders (Anderson & Geetha, 2013).	Exercise mediate exercise-induced enhancement in the monoamine systems, by acting as "antidepressant" effects by increasing serotonergic and noradrenergic levels in the brain (Lin & Kuo, 2013).
	Neurotropic Factors	Brain-derived neurotrophic factor (BDNF), are found throughout the body and is involved with neurogenesis and neuroplasticity and have a possible role in the pathology of mental health disorders (Nuernberg, Aguiar, Bristot, Fleck, & Rocha, 2016).	Exercise seems to increase BDNF's in the brain associated with cognitive an alleviation of depression and anxiety. However, the precise mechanism is not yet well understood (Sleiman et al., 2016).

Psychological Mechanisms	Self-Efficacy	From the social cognitive theory, self-efficacy has an important role in regulating emotional states. Individual's self-efficacy regarding the ability to control external threats has an important relationship with arousal levels (Rabani, Towhidi, & Rahmati, 2011).	It has been argued that exercise can increase self-efficacy by providing opportunities of successfully coping with the stress of exercise (Petruzzello, Landers, Hatfield, Kubitz, & Salazar, 1991). The changes take place through changes in physical efficacy, physical competence and physical acceptance (Sonstroem & Morgan, 1989).
	Distraction Hypothesis	A "time out" or distraction is another proposed hypothesis in how exercise is a good strategy to reduce stress and anxiety (Barhrke & Morgan, 1978). This hypothesis suggests, that diversion from disagreeable stimuli or time away from the ups and downs of life might have some anti-depressants effects, by being distracted from stressors (Paluska & Schwenk, 2000).	Physical activity and exercise act as a distractor from worries and negatives thoughts (Barhrke & Morgan, 1978). Exercise is distracting and can take individual's mind out of worries and stress.

Physical Activity and Acculturation

The immigration literature presents a thought-provoking effect known as "healthy immigrant effect" which is defined as "an observed time path in which the health of immigrants just after migration is substantially better than that of comparable native-born people but worsens with additional years in the new country" (McDonald & Kennedy, 2004). The healthy immigrant effect has been reported in multiple countries such as Canada, Australia, United States (Kennedy,

McDonald, & Biddle, 2006) .In the literature, the effect is often attributed to numbers of factors such as: immigrant self-selection, in where healthier immigrants are more likely to immigrate as they are physically and economically able to do so. Another possible explanation of the healthy immigrant effect is the fact that most host nations request health assessments from the migrants prior to immigration, resulting in host nations "selecting" healthier individuals. Yet another possible explanation is that new immigrants may under-utilize health services and therefore appear as though they are not getting ill or need medical treatment, thereby not being included in the statistics reports (McDonald & Kennedy, 2004).

The acculturation research on physical activity highlights four trends: 1) ethnic minorities tend to report lower levels of leisure time physical activity 2) ethnic minorities meet the weekly physical activity guidelines to a lower extent than the majority of the population 3) the differences are bigger amongst minority women 4) physical activity amongst ethnic minorities is influenced by a number of individual-factors including, socioeconomic status, marital status and education (Gerber et al., 2012). The literature in acculturation and physical activity shows mixed results between the association of acculturation and leisure time. In a systematic review done by Gerber et al. (2012), 44 studies involving physical activity and acculturation were analyzed. The authors found that in 57% of the studies acculturation was associated with higher physical activity levels, while the rest of the studies demonstrated the opposite effect or no association at all (Gerber et al., 2012). While there are few studies focused specifically on international students, this research on immigration and acculturation for physical activity is informative. It is also not not clear if the "healthy immigrant effect" is observed in the international student population to the

same extent as it is observed in other newcomers; however, the literature on international students consistently indicates that they are doing far worse than their domestic counterparts in many mental health adjustment scales (Mori, 2000).

Each international students' cultural background and their acculturation process in the host country may also influence their physical activity participation. Other factors such their ethnicity, gender, background, place of origin and other influences may also be relevant. In addition, different groups may encounter other significant obstacles for participation in physical activity (Yan & Cardinal 2013). For example, female immigrants in all ethnic's groups are less physically active than their male counterparts (Lee, 2005), which means that sex is an important variable to be addressed. In other circumstances, students may be unfamiliar with the host country policies and their different approaches and delivery of physical activity programs and therefore might not know how to get involved.

Physical Activity Benefits for International Students

As it was mentioned earlier, physical activity has a myriad of benefits both at the psychological level and physiological level but there is a current lack of research regarding these benefits in a population as specific as that of international students. From other similar acculturative groups such as new immigrants and refugees, physical activity has shown to improve mental health and mental well-being(Reijneveld, Westhoff, & Hopman-Rock, 2003). In elderly immigrants, leisure physical activity was shown to improve individual's optimism, positive affect, and life satisfaction (Kim et al., 2006). These findings seemed to be supported by multiple systematic reviews looking at the psychological and social benefits of sports and physical activity participation. For example,

Eime, et al. (2013) found that team sports participation has been associated with lower mental health problems and higher general health compared with inactive individuals; and these team sports benefits may be due to the positive effects related to good coaching, skill development, and peer support in improving social acceptance (Eime, Young, Harvey, Charity & Payne, 2013). It is evident that physical activity and sports provide several benefits for the public and many acculturative groups. However, there is limited research concerning the physical activity patterns of international students on and off campus. A key focus in the current proposal is to better understand the physical activity levels of international students at the University of Toronto.

Physical Activity Barriers for International Students

Although the evidence regarding the physiological and psychological benefits of physical activity is overwhelming, epidemiological evidence shows a decline in physical activity levels from high school to college (Kilpatrick, Hebert , & Bartholomew 2005). Additionally, current activity patterns in university students are inadequate to improve health and fitness (Kilpatrick et al., 2005). According to the 2000 National College Health Assessment, 57% of male and 61% of female college students stated that they did not perform vigorous or moderate exercise on at least three of the previous seven days (Buckworth & Nigg, 2004). These findings are aligned with data from the National College Health Risk Behavior Survey in which researchers found that 35% of college students reported being overweight or obese (Lowry et al., 2000). There are numerous physical activity barriers that university students encounter but amongst the most common ones are: lack of time, lack of appropriate facilities nearby (or suitable for their preferred physical activity or sport), lack of social support (not having someone to participate with), and internal barriers such as disliking some physical activities or not finding them useful (Gomez-Lopez,

Granero Gallerso, & Baena Extremera, 2010). The literature indicates that people who encounter most physical activity barriers are less likely to become physically active (Sallis, Prochaska, & Taylor, 2000). While it may be expected that international students face these main physical activity barriers and additional unique barriers, little is known about the physical activity experiences in this population.

Most of the evidence on physical activity patterns focuses on other minorities and refugees and not specifically on international students (Berry, 1974; Crockett et al.,2007). This is a challenge since international students and refugees are unique subgroups (Mori, 2000). Nonetheless, Shifman et. al (2012) found that international students who participated in intramural sports experience more interpersonal and intrapersonal limitations when compared to domestic students who also participated in intramurals. International students in this study revealed that perceived lack of time, high self-consciousness, and not having anyone to participate with were some of the reasons that prevented them from participating in intramural sports. Another study is that by Collins & Chinouya (2017), studying female international students in London, UK. The authors found that the students did not have a good awareness of the physical activity recommendations and some of the perceived barriers to become physically active included, language, feeling isolated, high cost of participation, low confidence to participate, lack of time, and not knowing how or where to participate(Collins & Chinouya, 2017). Overall, there is a lack of research in how international students are engaging in physical activity on campus. This study would provide valuable insight in the field as it would be one of the first studies that focuses on international student's current physical activity levels and needs. A strength of this study is that

it will add value to the current literature on international students, as there is limited research on information regarding this population and physical activity and awareness levels; which would mean that this study does not have any similar precedents.

Current Study

The objective of this study is to investigate international student's physical activity and mental health levels. International students are important members of the student body at the University of Toronto and there is a lack of empirical research examining their mental and physical activity needs. Therefore, the objective of this thesis project is to describe international students' patterns of engagement in physical activity and mental health activities at the University of Toronto, and to examine the relationship between physical activity and mental health within an acculturation framework, and to explore international students' experiences with physical activity and mental health on campus. The latter points arise from research suggesting that effective support from school administration and the availability of orientation sessions are key factors in the successful transition of international students (Hyun et al., 2007). Unfortunately, it has been well reported that international students significantly underutilized these resources on campus, a study reported that only 2% of international students sought counselling services and from those students a third dropped out after the initial session (Mori, 2000; Nilsson et al., 2004). Therefore, the interest is to explore if international students have similar barriers to participate in physical activity as they do with other institutional resources.

Two different studies were conducted in order to answer the research questions presented in this study. Study one aims at characterizing international students' levels of physical activity and reports of mental health and stress, as well as examining the association between

stress, physical activity and mental health in an acculturation framework. Study two is designed to explore international student's experiences and perceptions regarding their adaptation, physical activity and mental health access and participation on campus at a large Canadian university.

CHAPTER 3

Study 1

Stress, physical activity, and mental health and mental illness among International and domestic students at a large Canadian University.

Abstract

North American universities and colleges continue to see an increase international student enrolment. Due to challenges in cross-cultural adjustment, international students may be more susceptible to unique stressors related to their acculturation process, and report high levels of mental health challenges. Physical activity may help to mitigate stress and symptoms of mental illness and foster mental health, yet little is known about this association among International students. The purpose of this study was to explore the association between stress, physical activity, and mental health and mental illness among international and domestic students. Specifically, the association between stress and mental health was tested, as mediated by physical activity. Student status (domestic or international) was tested as a moderator of the association between stress and physical activity. Secondary data from domestic (n = 4035) and international (n = 605) students were analyzed from the Spring 2016-National College Health Assessment II at a large Canadian University. **Results:** There were no significant differences on physical activity, stress, mental health or mental illness symptoms between domestic and international students. Physical activity mediated the association between stress and mental health *b*=*-.00299*, BCa CI = -.0586 to -.0047) but it did not mediate the association between stress and mental illness *b*=.0018, BCa CI (-.0001, .0047). Student status moderated the association between stress and physical activity *b*=.1868 (SE = .0747), *p*=0.012, whereby domestic

students engaged in less activity as stress increased. These findings suggest that, when compared to their domestic peers, international students have similarly low levels of physical activity as well as high stress and mental illness levels. Moreover, stress may not be an important predictor of physical activity for international students. However, it is possible that international students might have different attitudes towards physical activity, and if this were the case, perhaps physical activity should be advertised and promoted differently to them. Together, these findings offer insights into international students' physical activity levels and the role physical activity could play as part of stress reduction tools for this population.

Introduction

Each year, many students from all over the world decide to pursue higher education in Canada. In 2017 alone, there were approximaley 494,525 international students studying in Canadian schools, this number accounts to a 115% increase since the year 2010 (CBIE, 2018). In Canada, over half of the international student population comes from Asia, with China (28%) and India (25%) leading the way (CBIE, 2018). While pursueing higher education can be an exciting and rewarding time for students, it can also be a daunting and stressfull process. In fact, international students normally report feeling frustrated, sad, lonely, discriminated, depressed and homesick, and If these emotions remain unchecked over time it can lead to a decline of mental health and the development of mental illnesses (Addington, Hutchinson, Mastrigt, & Addington, 2002; Mori, 2000; Moussav, et al., 2007). Overall, international students are more vulnerable to unique stressors and challenges stemming from cross-cultural adjustment (Lee et al., 2004; Kuo, 2014). Tseng and Newton (2002) categorized these stressors in four categories, including general living adjustments (i.e., the adjustment to food, weather, dealing with financial concerns); academic

adjustments (i.e., adjustment to the educational system, language and pressure of academic success); socio-cultural adjustments (i.e., cultural acculturation, racial discrimination, adjusting to social/norms and cultural expectations); and personal psychological adjustments (i.e., experiencing homesickeness, loneliness, depression, loss of status or identity). The failure to successfully adjust to the new society can lead to a decrease in mental health, increased symptoms of mental illness, and the increase likelihood of developing illnesses such as depression and anxiety (Hyun, et al., 2007; Mori, 2000). Furthermore, international students are less likely to seek mental health support, and, those students that do seek support are more likely to stop the treatment ahead of time (Pedersen, 1991).

While symptoms of mental illness may be high among international students, little is known about the more positive mental health outcomes for this segment of the university campus population. There is enough evidence to recognize mental health as a dichotomous category: mental health (i.e., flourishing) and mental illness (i.e., languishing) (Keyes, 2005). As endoresed by the World Health Organization, mental health can be observed without understanding mental illness, and vice versa, “mental health is not simply the absence of mental illness” (WHO, 2004). Symptoms of mental illness, including depression and anxiety, are prevalent (Lim et al., 2018; Vasiliadis, Lesage, Adair, Wang, & Kessler, 2007). In Canada, it has been estimated, that 1 in 5 Canadians will experience mental illness in their life (Smetanin et al., 2011). At the collegiate level the prevalence is just as high, where 11.9% of college students suffered from anxiety disorders and there is a 7 to 9% prevalence of depression (Paola, Nyer, Albert, & Zulauf, 2015). On the other hand, positive mental health has been shown to be protective against all-cause mortality, academic impairment amonst students, and predict future

risk of depression (Corey & Simoes, 2012; Grant, Guille, & Sen , 2013). Rates of positive mental health are less known since research tends to focus on the pathologies at the expense of understanding well-being. Given this evidence, more research is needed to understand the mental health and symptoms of mental illness reported by international student in new academic environments that often require adaptation.

The process of adaptation for international students is widely studied from an acculturation perspective. Acculturation is the process of cultural, psychological, and social change that stems from direct and repeated contact between two or more different cultures (Redfield et al., 1936). There are several models that aim to explain the acculturation process and interactions between cultures. Berry's (2003) framework has been used extensively in the acculturation literature and has been considered amongst the most influential works on acculturation (Kuo, 2014). The framework divides acculturation as a "group level" and "individual level" effect (Berry, 2003). At the group level, acculturation is seen as the compatibility or incompatibility in cultural values, norms, customs, attitudes, beliefs, amongst the two communities in contact, and is considered to create a change in either one or both groups but is clear that no group remains unaffected after the cultural contact (Berry, 1997; Sam & Berry, 2010). At the individual level, the acculturation has an emphasis on the psychological adjustment of individuals in both groups (Berry, 2003). In the model, adaptation is the result of acculturation (Sam & Berry, 2010) and the consequence of a lack of adaptation to a society is known as acculturative stress (Berry, Kim, Minde, & Mok, 1987).

Acculturation stress is the physiological, psychological, and social aspects that are explicitly associated to the acculturation process (Desa, Yusooff, & Abd Kadir, 2012). The extent that

someone experiences acculturative stress can range from mild stress to an unbearable stress that worsens over time (Berry et al., 1987). The lack of a proper adaptation can be manifested physically by a decline in the immune system, heightened vulnerability to illnesses and can lead to a dysfunction of the pituitary-adrenal activities amongst many other physiological responses (Selye, 1950; Thomas & Althen, 1989; Winkelman, 1994). Furthermore, acculturation stress can be accompanied by the manifestation of symptoms of anxiety and depression and a decline of mental and physical well-being over time (Desa et al., 2012). Unfortunately, these symptoms are rarely addressed since reports consistently show that international students continue to be an underrepresented population accessing mental health resources on campus (Forbes-Mewett & Sawyer, 2016; Pedersen, 1991). There are several reasons international students may not be accessing mental health resources on campus; but the stigma, lack of awareness and cultural disparities to access services continue to be relevant for this population (Hyun et al., 2007). As such, strategies to mitigate symptoms of acculturation stress need to be identified.

Physical activity may be a targeted approach to help improve acculturation stress. There is ample research evidence on the benefits of physical activity for physical and mental health benefits for a wide range of targeted groups, as well as supporting evidence on the benefits that physical activity has amongst other similar acculturative groups such as recent immigrants (Taylor & Doherty, 2005; Tremblay et al., 2006). For example, physical activity has been found to be effective in reducing depression and negative moods as well as improving self-confidence and individual self-esteem (Callaghan, 2004; Deslandes et al., 2008). Physical activity has also been shown to have stress-buffering benefits by increasing the production of endorphins, neurotransmitters in the brain that act as painkillers, as well as improve sleep quality (Eyre &

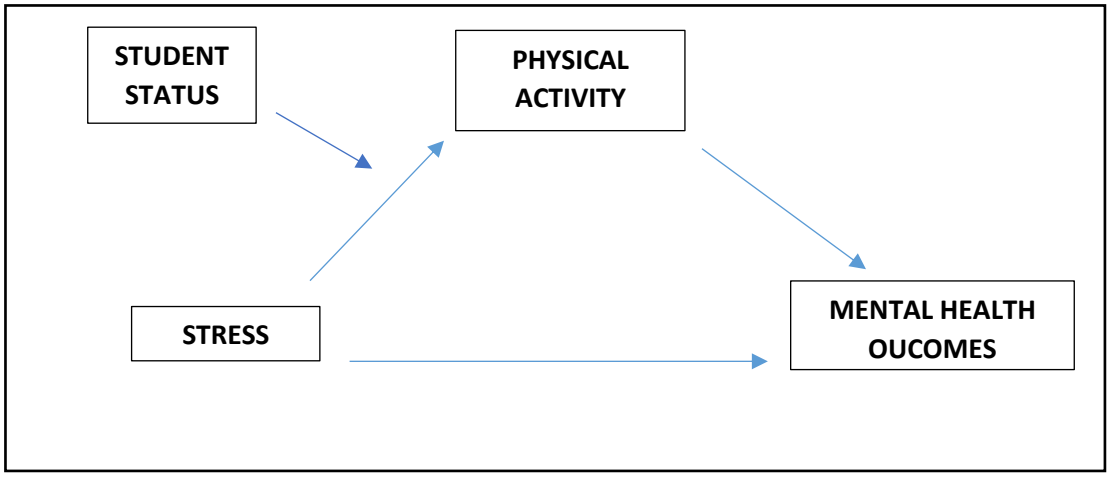
Baune, 2012; Salmon, 2001;). Physical activity has been presented as an alternative to help mediate mental health symptoms and aid in the acculturation process of international students (Li & Zizii, 2017). In other acculturative group such as elderly immigrants, leisure physical activity was shown to improve individual's optimism, positive affect, and life satisfaction (Kim, Chun, Heo, Lee, & Han, 2006). While this evidence of the positive mental health benefits of physical activity is promising, international students may be less likely to participate in physical activity as a result of the higher stress they experience. In fact, there is evidence that individuals under stressful conditions (such as acculturation) are less active (Liu et al., 2009).

Overall, there is evidence to suggest physical activity may improve the acculturation process, however there is a lack of evidence linking stress, physical activity, and mental health among international students.

Drawing broadly on the acculturative stress model (Berry, 2005) the purpose of the current study is to explore the association between stress, physical activity, and mental health and symptoms of mental illness among international and domestic students. Student status (i.e., international or domestic) was tested as a moderator of the association between stress and physical activity given that the experience of stress and the association with physical activity may be different for international compared to domestic students (Hypothesis 1). Physical activity was tested as a mediator of the association between stress and mental health and symptoms of mental illness. Based on empirical evidence, it was hypothesized that stress would be negatively associated with physical activity (Haungland et al., 2003; Inger et al., 2011) and positively directly associated with symptoms of mental illness (Hypothesis 2A) (Schneiderman, Ironson and Siegel, 2008). In addition, it was hypothesized that physical activity would mediate the relationship

between stress and mental health outcomes (mental illness and mental health) (Hypothesis 2B). Finally, it was also expected that student status (domestic or international) would moderate the association between stress and physical activity (Hypothesis 3). Figure 3 is used to depict the associations tested in this study.

Figure 3. An integrated model of the relationship between student status, stress, physical activity and mental health outcomes.



Methods

Participants & Procedures

Secondary data from domestic and international students were analyzed from the National College Health Assessment II (ACHA-NCHA) at a large Canadian University. The survey was collected across three campuses in the spring of 2016, whereby 15,000 undergraduate and graduate students were randomly selected and invited to participate in the study through email. The final sample size was 4640 students, including 605 international students and 4035 domestic students. The ACHA-NCHA, with the objective to assess and understand the health needs of college students, has been analyzed and evaluated extensively for reliability and validity in US

colleges (Douglas et al., 1997). The ACHA-NCHA questionnaire consists of approximately 58 questions with 300 items branched into content areas related to health, health education, and safety, sex perceptions and behaviour, weight, nutrition, and exercise, mental and physical health, barriers to academic performance, and demographics. The questionnaire is completed online.

The students from the current Canadian city were on average 22.41 years of age (SD=5.15). Of the international students represented in the survey (N=605), 36% were male and 64% were female, with a mean age of 22.44 (SD=4.21). From the domestic students (N=4035), 31% were male and 69% were female, (M age= 22.44, SD=5.28).

Measures

Descriptive measures. Demographic questions included age, sex (male, female), gender (i.e. woman, men, trans women, trans man), year in school, student status (ie, full- or part time student), race or ethnicity, relationship status and living situation (i.e. living on campus, or other off-campus housing). Types of engagement in physical activity opportunities on campus were also assessed for descriptive purposes, including intramurals, clubs, and varsity athletics.

Stress. Self-reported stress is a consistently used marker to assess stress while studying college population (Oswalt & Wyatt, 2011). Stress was measured by student's self-reporting: "Within the last 12 months, how would you rate the overall level of stress you have experienced?" with response options ranging from 1 = no stress, 2 = less than average stress, 3 = average stress, 4 = more than average stress, and 5 = tremendous stress. Higher total scores indicate more self-reported stress from students.

Physical Activity. Physical activity was measured based on self-reported moderate to vigorous physical activity (MVPA). The specific questions were informed by physical activity guidelines (Tremblay, et al., 2011; Tucker, Welk, & Beyler, 2011) and common measures of MVPA (Craig et al., 2003; Godin & Shephard, 1985; Prochaska, Sallis, & Long, 2001) and included: "*On how many of the past 7 days did you do moderate-intensity cardio or aerobic exercise (caused a noticeable increase in heart rate, such as a brisk walk) for at least 30 minutes?"* and "*On how many of the past 7 days did you do vigorous-intensity cardio or aerobic exercise (caused large increases in breathing or heart rate, such as jogging) for at least 20 minutes?"* The average number of days engaged in MVPA was computed and used for the current study.

Mental Health. Mental health was divided in two separate categories, mental illness and mental health, to reflect a "dual continuum" of mental health (Keyes et al., 2010; Greenspoon & Saklofske, 2001; Suldo & Shaffer, 2008). Mental illness symptoms were assessed using the self-reported questions for depression (i.e., have you ever felt so depressed it was difficult to function?), anxiety (i.e., Have you ever felt overwhelming anxiety?), hopelessness (i.e., Have you ever felt things were hopeless?) and sad (i.e. have you ever felt very sad?). The response options to the questions were: never, not in the last 12 months, yes in the last 2 weeks, yes in the last 30 days, yes in the last 12 months. Any symptoms reported within the last month of the study were coded as a 1 and added together for a sum score representing the number of symptoms most recently reported. This variable was then used as an indicator of mental illness symptoms. Mental health was assessed by feelings of happiness and satisfaction with life (i.e., During the past month, how often do you feel... happy/satisfied with life) responded as frequency: 1 = never, 2 = once or twice, 3 = about once a week, 4 = about 2-3 times a week, 5 = almost every day, 6 =

every day. The items for happy and satisfied with life were averaged for a total mental health score. In this way, mental health is an index of frequency of happiness and satisfaction with life. Happiness and life satisfaction are key components of well-being and positive mental health (Keyes, 2007). In the current study the Cronbach's alpha were α= 0.83 for the mental illness scale and α= 0.85 for the mental health scale.

Data Analysis

Descriptive statistics and Pearson correlations coefficients were calculated using SPSS version 24.0. Data were screened for outliers and missing data. Moderation and mediation analysis were generated using the SPSS macro (Hayes, 2018) version 3.1. Process. Model 1 (Hypothesis 1: Student status would moderate the relationship between stress and physical activity), Model 4 (Hypothesis 2B, physical activity levels, would mediate the relationship between stress and mental illness and mental health) and Model 7 (Hypothesis 3A; student status would moderate the indirect relationship between stress and mental illness and mental health through physical activity acting as a mediator) were used to test the moderation, mediation and moderated mediation hypotheses. Bootstrapping (*k*= 5000) procedures and confidence intervals (95%) were used for the mediation and moderation analysis. Evidence for the mediation and moderation in the bootstrap sample can be determined with the absence of zero in the confidence interval (Efron, 1987; Efron & Tibshirani, 1993).

Results

Preliminary analysis

Sample characteristics are presented in Table 2. Descriptive statistics, Pearson correlation and internal consistency reliability estimates are presented in Table 3. Based on these data, students reported generally high levels of stress, mental illness symptoms, and mental health with average scores around or above the midpoint of the scales. Students reported less than 2 days a week of MVPA. Stress was significantly correlated with mental illness symptoms (r = .38, p < .001) and mental health (r = -.32, p < .001). There was also positive significant relationship between physical activity and mental health (r= .13, p<. .01) and a negative significant relationship between physical activity and mental illness (r= -.52, p<. .01).

Descriptively, when compared to their domestic peers, international students have similarly low levels of physical activity such that 12% percent of international students and 15% of domestic students met the physical activity guidelines of at least 150 min of MVPA per week (X^2 (1) = 2.72, p = .099). International students also had lower numbers compared to domestic students in participation in intramural sports (9% vs 13%; X^2 (1) = 5.083, p = .024) but higher numbers in participation in varsity (5% vs 3%; X^2 (1) = 4.510, p = .034) and club sports (13% vs 9%; X^2 (1) = 11.95, p = .001). Based on the numbers of symptoms of mental illness, 51% of the international students reported having at least one mental illness symptoms in the last 12 months compared to 59% of domestic students,X^2 (1) = 15.350, p < .001). Domestic students reported slightly higher percentages of anxiety (40% vs 35%; X^2 (1) = 5.180, p = .023), sadness (48% vs 41%; X^2 (1) = 10.366, p = .001) and hopelessness (38% vs 33%; X^2 (1) = 4.724, p = .030), but lower

levels of depression (25% vs 28%; X^2 (1) = 2.251, p = .134) compared to international students in the last 12 months.

Table 2. Participant demographic characteristics by domestic and international student status.

	Domestic Student		International Student	
	Total		Total	
	n	%	n	%
Characteristics				
Sex				
Female	2798	69%	387	64
Male	1237	31%	218	36
Age				
18-20 years	1688	42.2	254	42.7
21-29 years	2008	50.2	303	50.9
>30 years	307	7.6	37	6.2
Gender Identity				
Woman	2750	68.1	378	62.8
Man	1216	30.1	216	35.9
Trans Woman	1	0	1	0.2
Trans Man	7	0.2	1	0.2
Gender Queer	19	0.5	19	0.4
Other	43	1.1	6	1
Student Status				
Full-time	3766	93.1	565	93.5
Part-time	225	5.6	23	3.8
Other	56	1.4	16	2.6
Year in school				
1st year undergraduate	663	16.5	150	25.1
2nd year undergraduate	702	17.5	102	17.1
3rd year undergraduate	728	18.1	92	15.4
4th year undergraduate	697	17.3	83	13.9
5th year or more	273	6.8	22	3.7
Graduate	935	23.3	145	24.2
Other	22	0.4	4	0.6
Race or ethnicity				
White	2572	63.5	178	29.4
Black or African American	167	4.1	34	5.6
Hispanic or Latino	109	2.7	30	5
Asian or Pacific Islander	1097	27.1	356	58.8
American Indian or Alaskan Native	42	1	10	1.7
Biracial or Multiracial	193	4.8	13	2.1
Other	203	5	15	2.5
Current relationship status				
Single	3510	87.3	541	90.2
Married/Partner	380	9.5	48	8
Separated	9	0.2	2	0.3
Divorced	26	0.6	1	0.2
Living Situation				
Campus residence hall	340	8.4	139	23.1
Fraternity or sorority house	9	0.2	6	1
Other university housing	49	1.2	27	4.5
Parent/guardian's home	2167	53.8	42	7
Other off-campus housing	1235	30.6	356	59.2
Other	231	5.7	31	5.2

Table 3. Descriptive Statistics and Correlations Among the Main Study Variables of Stress, Physical Activity, Mental Illness and Mental Health.

	Range	M(SD)	α	Stress	Physical Activity	Mental Illness	Mental Health
All Students							
Stress	0.00-5.00	3.67 (.85)	-	-	-0.03*	0.38**	-0.32**
Physical Activity	0.00-7.00	1.66 (1.57)	.67		-	-0.05**	0.13**
Mental Illness	0.00-4.00	1.49 (1.56)	.83			-	-0.42**
Mental Health	0.00-5.00	3.19 (1.21)	.85				-
Domestic Students							
Stress	0.00-5.00	3.71 (.82)		-	-0.05**	0.38**	-0.34**
Physical Activity	0.00-7.00	1.68 (1.57)			-	-0.64**	0.13**
Mental Illness	0.00-4.00	1.51 (1.56)				-	-0.43**
Mental Health	0.00-5.00	3.21 (1.21)					-
International Students							
Stress	0.00-5.00	3.67 (.85)		-	0.55	0.38**	-0.29**
Physical Activity	0.00-7.00	1.54 (1.58)			-	.02	0.12**
Mental Illness	0.00-4.00	1.36 (1.59)				-	-0.35**
Mental Health	0.00-5.00	3.04 (1.261)					-
*p<. 05, **p<. 0.01 level							

Main Analysis

To test Hypothesis 1A, proposing that student status would moderate the relationship between stress and physical activity, the interaction was significant, *b*= .1868 (SE = .0747), *p*= .012 to suggest that the relationship between stress and physical activity levels is moderated by student status. In addition, stress, *b* = -.093 (*SE* = .0309), *p* = .002, student status (domestic), *b* = -.8231 (*SE* = .2674), *p* = .002, and biological sex (male), *b* = .167 (*SE* = .0508), *p* = .001, were also significant correlates of physical activity. Exploring the moderation effects, there was a significant relationship between stress and physical activity levels for domestic students (*b*= -.0925, 95% CI = -.1530 to -.0320, *p*=.002) and not for international students (*b*= .0941, 95% CI = -.0395 to .2278, *p*=.1674).

As a test of hypothesis 2B (physical activity as a mediator of the relationship between stress and mental illness and mental health), level of stress significantly predicted symptoms of mental illness and predicted physical activity, while controlling for age and biological sex, and the path between physical activity and symptoms of mental illness was significant. However, there was a non-significant indirect effect of stress on symptoms of mental illness through physical activity, *b*=.0018, BCa CI (-.0001, .0047). The model accounted for 17 % of the variance in symptoms of mental illness.

In a similar model predicting mental health, the paths between stress and physical activity, stress and mental health, and physical activity and mental health were all significant. There was a significant negative indirect effect of stress on positive mental health outcome through physical activity, b=-.00299, BCa CI = -.0586 to -.0047). The model accounted for 13 % of the variance in mental health.

As a test of hypothesis 3A, whereby it was hypothesized that student status would moderate the indirect relationship between stress and symptoms of mental illness and mental health through the mediation of physical activity, the moderated mediation was significant for both symptoms of mental illness and for mental health. For mental health there were significant indices of moderated mediation, b=-.0170, SE (bootstrapped) = .0082, 95%, CI (.0012, .0336). Follow up analysis demonstrated that the conditional indirect effect was only significant for domestic students: b=-.0092, *SE* (bootstrapped) = .0031, 95%, CI (-.0158, -.0032) and not for international students: b=.0078, *SE* (bootstrapped) = .0078, 95%, CI (-.0068, .0225). For mental illness, the results were similar, in where they were significant indices of moderation mediation b=-.0061, *SE* (bootstrapped) = .0038, 95%, CI (- .0149, -.0002). Follow up analysis demonstrated that the conditional indirect effect was only significant for domestic students: b=-.0031, *SE* (bootstrapped) = .0017, 95%, CI (.0003, .0071) and not for international students: b= -.0061, *SE* (bootstrapped) = .0038, 95%, CI (-.0096, .0018).

Table 4. Regression Model Estimating Stress as Direct Effect of Mental Health Outcomes and Physical Activity Acting as a Mediator of the relationship.

Mental Illness					**Mental Health**				
	Coefficient (SE)	***t* value**	***p* value**	**95% CI**		**Coefficient (SE)**	***t* value**	***p* value**	**95% CI**
Constant	0.12	0.88	0.3779	-.16, .41	Constant	4.74	40.98	< 0.01	4.51, 4.97
Stress	0.69	27.26	0.01	.65, .75	Stress	-4.74	-23.03	< 0.01	-.51, -.43
Physical Activity	-0.33	-2.41	0.02	-.06, -.01	Physical Activity	0.09	8.68	< 0.01	.07, .17
Age	-0.03	-7.93	0.01	-.04, -.02	Age	0.01	3.89	< 0.01	.01, .02
Biological Sex	-0.31	-6.84	0.01	-.41, -.23	Biological Sex	-0.19	-5.12	< 0.01	-.26, -.12
Model R2	0.17				Model R2	0.12			
Note. Indirect effects coefficient = .001 (SE = .0001), 95% CI [-.00, .00]					Note. Indirect effects coefficient = -.005 (SE = .0028), 95% CI [-.01, -.00]				

Discussion

This study sought to examine the association between stress and mental health and illness among international and domestic students, and the mediating effect of physical activity. Findings revealed that student status moderated the association between stress and physical activity whereby domestic students engaged in less activity with higher levels of stress. This association was not significant for international students. Furthermore, physical activity mediated the association between stress and mental health, but it did not mediate the association between stress and mental illness. Also, there was moderated mediation indices for domestic students suggesting that these associations were different based on student status. Together, these findings offer insights into the acculturation model and the potential value of physical activity.

In support of the first hypothesis, the results indicate that the relationship between stress and physical activity levels is moderated by student status, whereby domestic students engaged in less activity, as stress increased. These findings are supported by several studies (Da Silva et al., 2012; Gerber & Puhse, 2009; McEwen, 2007) where researchers show that there is a reciprocal relationship between stress and physical activity. This occurs in such a way that stress can create a behavioural deactivation, decreasing physical activity behaviour and vice-versa (Stults-Kolehmainen & Sinha, 2014). For international students, this association was not significant, however it was observed that international students physical activity levels were lower than domestic students. Based on the results of the current study, stress may not be an important predictor of physical activity for international students. It may be that international students do not associate lower stress as a physical activity benefit, and there is no implicit or explicit association. It would be valuable to study international student's attitudes towards physical activity and compare them to domestic students. Previous research has demonstrated

differential attitudes of international students toward other health and wellness behaviours, such as seeking professional counselling, due to demographic and experiential variables (Dadfar & Friedlander, 1982). Therefore, it is possible that international students might have different attitudes towards physical activity, and if this were the case, perhaps physical activity should be advertised and promoted differently to them.

In support of hypothesis 2A, stress was significantly associated with symptoms of mental illness and mental health in the expected direction based on simple correlations and the mediation models. These findings suggest that higher stress over the last 12 months is related to higher frequency of symptoms of mental illness and lower mental health (happiness and satisfaction with life). These findings supported those of Bovier et al., (2004), who found that stress was the strongest correlate of mental health in a sample of young adults. Moreover, these findings align with previous research regarding the role that stress has on mental health (Cokley, McClain, Enciso, & Martinez, 2013; Harthley, 2011). Therefore, it is essential to state that stress continues to be an important contributor of health and well-being at the college level and should continue to be examined.

Physical activity was expected to mediate the relationship between stress and symptoms of mental illness and mental health. Nonetheless, physical activity only mediated the relationship between stress and mental health. Based on these findings, higher reports of stress relate to less days of MVPA and lower reports of mental health. The opposite is also possible, such that lower stress fosters more engagement in MVPA that heightens perceptions of mental health. This finding aligns with a wealth of evidence in the positive benefits of physical activity and mental health improvements (Becofsky, Baruth, & Wilcox, 2016; Fontaine, 2000). As well, Vankim and

Nelson (2012) found that students meeting physical activity recommendations reported a lower frequency of poor mental health and perceived stress, compared to students that did not meet recommendations. Despite the negative relationship between stress and physical activity, and physical activity and mental illness, physical activity did not mediate the relationship between stress and mental illness. There is consistent evidence of the simple associations found in this study, in that physical activity can reduce the severity and frequency of the specific symptoms (anxiety, depression, hopelessness and sadness) (Sibold et al., 2015; Ströhle, 2009; Taliaferroe et al., 2009) and stress is associated with less physical activity (Stults-Kolehmainen & Sinha, 2014). Given that physical activity is a complex behaviour beyond just minutes of MVPA (e.g., frequency, type), more research is needed to discern the potential reasons for non-significant mediation. Nonetheless, it may be that many students showed a low level of physical activity per week and only 14.5% of students met the MVPA guidelines, and these low levels of physical activity were not enough to significantly mediate the association. Hammer, et al (2009) found that mental health benefits were observed at a minimal level of 20 min/week of any physical activity, however, this dose-response was shown to have a greater risk reduction, the higher the volume and/or intensity of the activity (Hamer et al., 2009). Further research might be needed to provide an adequate physical activity dosage to reduce mental illness (Ströhle, 2009).

In partial support for the last hypothesis, the moderated mediation was significant for both symptoms of mental illness and for mental health. The probing of the effect suggested that the conditional indirect effect was only significant for domestic students for both mental health and mental illness. This finding suggests student status (domestic or international) might play a greater role in the relationship between stress and mental health through physical activity only

for the domestic students and not for international students. This would indicate that physical activity might play an important role in the management of mental health and mental illness for domestic students. It is unclear why this relationship was only seen for domestic students and not international students. This finding may again relate to a general disconnect between attitudes and beliefs and behaviours, whereby international students may generally have different thoughts on the benefits of MVPA and not link stress management.

Aligning with the descriptive findings, the physical activity levels (including exercise and sport) of International students is low and stress level and mental illness level are high. As numerous higher-level education institutions continue to increase international student recruitment, it is important to understand and recognize international student's requirements barriers to participation in physical activity, academic success and successful adaptation. The current findings suggest several areas for future study. Examining international students' experiences, beliefs and attitudes of physical activity may help to better understand the current study findings. Likewise, this study, studied international students as a homogeneous group, but it would be recommendable to study international students based on their country of origin, cultural background, gender, and years of study abroad. As all these variables could potentially influence the relationship and participation with physical activity, stress, mental health and mental illness. It is generally encouraged that large surveys of university students focus on assessment with a cultural lens to better capture characteristics that might help understand associations similar to the ones tested in the current study.

In spite of the novel findings in this study, it was not without limitations. Limitations of this study include utilizing a general stress variable instead of using a more appropriate tool to

capture “acculturative stress” such as the Stress Scale for International Students (ASSIS) (Sandhu & Asrabadi, 1994). The ASSIS scale was developed specifically for international students and may be an appropriate to study the acculturation framework. Additionally, all data information were from self-reported responses that are subject to misclassification and the ACHA-NCHA is not designed to be a comprehensive physical activity, stress or mental health measure and as such provides a general overview of these self-reported perceptions among students. Additionally, the ACHA-NCHA survey does not differentiate participants based on nationality or country of origin. Therefore, domestic and international students were treated as two separate homogeneous groups. However, it is possible that the international student sample included enough social and cultural diversity (e.g., social structures, individualism vs collectivism self, morals, ethnic differences, etc.) that it should have been studied as a heterogeneous group based on nationality or country of origin. Likewise, we were not able to measure cultural and social factors since they were not assessed in the ACHA-NCHA. These variables are important predictors that could influence acculturation, physical activity and mental health (Kramer, Kwong, Lee and Chung 2002; Bauman et al, 2012). Therefore, it would be recommended that these types of questions be included in future disseminations of the ACHA-NCHA survey. In addition, the diversity and cultural scope attained by the survey should be frequently reviewed. Finally, the sample size for domestic compared to international students was uneven and the volunteer non-probability sample limits generalizability.

In conclusion, this study contributes to the large and growing evidence of relationships between stress, mental illness, mental health, and physical activity (Penedo & Dahn, 2005; Wankel, 1993; Warburton, Nicol, & Bredin , 2006) among domestic and international students.

Physical activity mediated the association between stress and mental health, but it did not mediate the association between stress and mental illness. This relationship was particularly salient for domestic students. More work is needed to understand the nuanced differences in the associations between domestic and international students. Nonetheless, when compared to their domestic peers, international students have similarly low levels of physical activity, participation in sports as well as high stress and mental illness level. Efforts aimed at reducing mental illness symptoms and stress, while improving mental health and physical activity on campus, are needed.

Bridge Text

In the first study, it was clear that international students have low levels of physical activity as well as high level of stress and mental illness and low levels of mental health. However, little is understood of international student beliefs, attitudes, and experiences in physical activity and in mental health. Therefore, the objective of the second study is to explore in more detail international students' experiences on a large Canadian campus.

Study 2

Understanding International Students' Experiences of physical activity and mental health on campus.

Abstract: Higher education institutions continue to be committed to increasing international recruitment efforts. However, international students face unique stressors due to cross-acculturation and adaptation challenges that may lead to poor mental health. Physical activity may be a protective factor, yet little is known about the physical activity experiences of international students. The current study investigated international students' perceptions and experiences regarding their adaptation, physical activity and mental health access and participation on campus at a large Canadian university. Interviews were conducted with 12 international students, were audio-recorded and transcribed verbatim, and analyzed using inductive thematic analysis. Based on the results, international students are encountering several cross-cultural, adaptation and organizational challenges that prevent them from accessing institutional supports on campus and engaging in extracurricular activities on and off campus. Physical activity was perceived as a positive tool to deal with stress and mental health, however, due to academic responsibilities and perceived family pressures, most of the students do not prioritize physical activity. Similarly, international students perceived mental health counselling as an effective strategy to deal with their mental health challenges. However, many students hesitate to seek help in a timely manner, and students who do seek help, face many barriers to access the desired assistance. Overall, international students continue to face perceived and tangible stressors that prevent them from accessing help resources and services on campus. Higher education institutions must continue to explore and understand international students needs and barriers in order to support them effectively.

Introduction

International students predominantly choose North America and Europe to pursue higher education studies. In North America, the institutional drive to increase international student recruitment is influenced by multiple factors, including financial gain, creating diversity on campus, fostering intercultural learning, and strengthening foreign policy interests (Knight, 2000; Li & Zizii, 2017; Snow 2006). Irrespective of the recruitment efforts and interests of college and universities to recruit international students, it is well documented that international students continue to experience several challenges to adapt to the new hosting nations (Lee, Koeske, & Sales, 2004; Mori, 2000; Perrucu & Hu, 1995). For most young adults, the transition from high school to college is a stressful process given that it is the first time students are living away from family and other social networks, taking new responsibilities and at the same time having to manage a rigorous academic schedule (Knight, 2000). International students must deal with these predicaments while also facing cross-cultural adaptation challenges. More specifically, challenges arising due to the acculturation process, such as language challenges, academic challenges (i.e., adjusting to a new educational system), interpersonal, financial, and intrapersonal conflicts (i.e., social loss and being away from family and friends) are all prevalent (Hayes & Lin, 1994; Mori, 2000). Due to these transitional and cross-cultural challenges, international students are more vulnerable to mental health impediments (Skromanis et al., 2018). Moreover, alarming statistics showed that over three quarters of individuals who develop mental health disorders do so between the ages 16 to 25 years (Martin, 2010), which is the age that most students choose to pursue higher education.

While the role of post-secondary institutions is not to provide psychiatric interventions, the majority of universities strive to create a mental health strategy and use preventative initiatives to reduce student stress (Jaworska, De Somma, Fonseka, Heck, & MacQueen, 2016). Post-secondary institutions develop programs aimed at promoting social support, encouraging self-care, and gatekeeper training (i.e. identify distressed students and referring to appropriate resources) (Jaworska et al., 2016). Regardless of these efforts, international students continue to underutilize the mental health resources (Hyun, Quinn, Madon, & Lusting, 2007). For example, Nilsson, et al. (2014), found that only 2% of international students sought counselling services during the academic year; and from those students a third discontinued treatment after the initial session. There are several factors that seem to thwart the utilization of mental health resources for international students, such as lack of awareness, different health-related cultural beliefs and practices (this is particularly strong for students who rely on non-western approaches to health care), a strong cultural stigma associated with emotional expression, and feeling the issues they are undergoing are not "severe" enough (Akhtar & Kröner-Herwig, 2015; Aubrey, 1991; Hyun et al., 2007; Nilsson et al., 2004; Storrie, Ahern, & Tuckett, 2010). Given that international students are a sub-group of university students who may be at risk for mental health symptoms, it is important to understand strategies to mitigate the risks.

Physical activity has been proposed as a coping strategy in this stressful transition to and through university due to the myriad of physical, emotional and social health benefits (Li & Zizii, 2017; Berger, Pargman, & Weinberg, 2002). Physical activity can improve mental health by reducing anxiety, depression, and negative mood, as well as improving cognitive function and self-esteem (Wipfli, Landers, Nagoshi, & Ringenbach, 2011). Moreover, regular physical activity

has been found to decrease symptoms of low self-esteem and social withdrawal (Sharma, Madaan, & Petty, 2006). Unfortunately, there is a lack of research in how international students are engaging in physical activity on campus and their perceptions towards physical activity (Gerber, Barker, & Puhse, 2012). Currently, the acculturative research on physical activity has focused on other groups such as new immigrants and refugees, and in these groups physical activity has been an effective tool to improve mental health and mental well-being (Reijneveld, Westhoff, & Hopman-Rock, 2003). However, little is known about the physical activity experiences in this university student population. Therefore, the purpose of this study was to understand international student's perceptions and experiences regarding their adaptation, physical activity and mental health access and participation on campus at a large Canadian university. To achieve this aim, a qualitative research design interviewing international students was used.

Methods

Participants

Twelve international students from a large Canadian University were recruited and participated in the study. Recruitment occurred purposefully via poster advertisements, by emailing international student groups on campus, and with the help of the research assistant network in the international student community. Participant characteristics are reported in Table 6. Ethical approval for this study was obtained through the office of research ethics at the University of Toronto. The eligibility criteria to participate in the study included being 18 years of age or older; being an International student (International students include students in Canada on a visa or refugees, neither of which have a permanent residency status in Canada); ability to understand and speak in English at a proficiency that warranted no translator, and not having a disability or

illness precluding physical activity. Exclusion criteria included domestic students and recent immigrants (permanent residency). Following informed consent, individual in-person interviews were scheduled and conducted at a university lab. Participant anonymity was preserved by allocating participant pseudonyms within the interview transcripts.

Table 5. Demographics of the participants (Pseudonyms are used for names)

Name*	**Age**	**Sex**	**Program/Year**	**Nationality**
Anna	19	Female	Rotman Commerce - 1st year	India
Henry	24	Male	Kinesiology - 4th year	South Korea
Felice	20	Female	Psychology - 2nd year	India
Julian	19	Male	Linguistics and Philosophy - 1st year	Costa Rica
Mary	19	Female	Social Science - 1st year	Italy
Rashford	23	Male	Masters in Aerospace Engineering - 1st year	India
Wengar	19	Female	Psychology and Neuroscience - 1st year	China
Alonso	23	Male	Exercise Science- 2nd year	India
Ashley	19	Female	Humanities & Social Sciences- 1st year	China
Kevin	24	Male	Statistical Science & Mathematics- 3rd year	South Korea
Jane	20	India	Biology	India
Teresa	19	Female	Psychology and Linguistic- 2nd year	India

Procedures

The interview guide was designed to capture broad experiences with mental health and physical activity on campus. The guide was developed based on empirical evidence and theoretical knowledge of acculturation (Berry, 2003, 2005; Kuo, 2014; Sam & Berry, 2010; Sandhu & Asrabadi, 1994; Zhou, et al., 2008) and included 25 questions and 12 probes, focused on their adaptation and experience on campus (e.g., can you describe your adaptation process?), physical activity and leisure (e.g., what are your perceptions towards physical activity and sports?), health, mental health-related knowledge, access to resources on campus (e.g., have you ever thought of using health-related resources on campus?), and their social network on campus (e.g., what does your social network look like here in Canada?). Interviews were audio-recorded and transcribed verbatim.

Data Analysis

All interviews were manually coded by the first author (DR) and a research assistant. ATLAS.ti version 8 software was also used to store, explore, organize and analyze the data. Thematic analysis was used to identify, analyze, organize and describe themes (Daly, Kellehear, & Gliksman, 1997) using Braun and Clark's (2006) six-phase guidelines. These phases included 1) Familiarization of data; 2) Generation of codes; 3) Theme searching; 4) Review of themes; 5) Definition and naming of themes; 6) Report production (Braun & Clarke, 2006).

Specifically, prior to the initial coding process, the first author immersed himself with the data by transcribing, reading, and re-reading the transcripts. Additionally, audio-recorded interviews were listened to multiple times, to ensure accuracy of the transcripts and to get more in-depth information from participant's communication style. Initial codes were first generated

following an inductive approach whereby the data (transcripts) were reviewed and features in the data were identified to form the initial codes. All participants' transcripts were given equal attention so that full consideration was provided to repeated patterns throughout the data set. Subsequently, theme searching consisted of combining different codes that were very similar to explain larger sections of the data. As suggested by Braun and Clarke (2006), a thematic map was developed to aid with the visual representation of the ideas and to produce linkages between codes and to aid with the generation of themes. Lastly, the review of themes and naming of the themes took place almost simultaneously, while reviewing the themes and mapping. These themes were reviewed by the second author (CS) and final names of the themes were identified following discussion and consensus.

Results

Three major themes and seven sub-themes were identified. Perceived Stress, Initial Adaptation and Expectations, and Self-Care were the overarching themes. These main themes and the sub-themes that emerged within them based on international student's experiences are presented below and supported by verbatim quotes from participants.

Perceived Stress

The transition to university as an international student was perceived to be stressful, as Rashford describes: *"At the beginning I thought, there is nothing wrong with me, there is no issue with me, maybe I'm just dumb. I cant hold my life together, I just cant maybe just manage all by myself, maybe is because of my upbringing I was too pampered until my 20's. I kind of was pushing everything on myself and I'm being very hard on myself which actually increased the amount of*

stress." While Rashford describes a general stress, students were also able to identify clear stressors they perceived to hinder their student experience on campus and their adaptation at the university. Many of the stressors that students identified were perceived as unique to them as international students, as Tanya describes: ***"****On some level, internally I do feel some extra stress. I'm paying international student fees and that does play in my mind, with my grades having to be at a certain level and my GPA at a certain point... I'm paying this much, why I'm not getting the same experience everyone else? …There is really no student opportunity").*

Consistent with Tanya's perspectives, the main sources of perceived stress were financial concerns, social stressors, and inequality and discrimination.

Financial Concern. Financial concern is a constant preoccupation in the mind of all international students. Interviewees reported that the cost of living, housing, tuition fees and extra cost to access health care and participate in extracurricular activities is a concern. To overcome some of the financial challenge, they described seeking more affordable housing away from campus, attempting to find part-time employment, and not engaging in activities where an extra cost is required. As Alonso reported, *"Well I used to be a swimmer in India. I was looking if there was anything like a swim team for graduate students or something like that, for people to get together to practice. It was either the high performance team or the master teams but the membership fee was really high, like $400, so I didn't find anything there."*

Some of the interviewees stated that they feel that the institution and other domestic students perceived them as being "economically wealthy" *(Mary)* or being "well off" (*Anna*). Nonetheless, most students commented that their families are going through great financial strain in order to

afford their studies abroad. This financial pressure can take away from participating in extra-curricular activities, and to become involved in campus activities, as often the students feel guilty to participate in extracurricular when they know their families have spent so much money and resources on them and they feel they should focus completely on academics and doing well on school. As Henry and Mary described their experiences:

> *"I think the toughest it comes with is the finances. Especially for the parents of students. They make decisions to study abroad because there is better education here, better opportunities, but that comes at a price and international students pay greater and significant amount of tuition…and I think because of that, we have greater motive to make up for that fee because it's not like 10 dollars here or 20 dollars there. If we fail to do well in school, and that reflects on how our parents' investments have been invested or used effectively."(Henry)*

> *"I think, if anything, I sometimes come across as wealthy, just because I am an international student and they are like, wow you pay the these fees? And I'm like yeah, I don't have a choice (laughs). That doesn't mean I can go out and eat lunch all the time, or spend the money in whatever, but yeah. I pay like $50,000 per year". (Mary)*

Overall, financial stress appears to be a burden both tangibly and perceptually on international students. A main reason for this is the feeling of guilt regarding misusing their family's financial support by underperforming academically. These financial anxieties can be exacerbated and become barriers for these students when it comes to engaging in extra curricular activities on

and off campus. This potentially happens as a result of the required extra payment and pressure to succeed. As a result, this potentially hinders students' ability to enjoy life on campus.

Social stressors. There was a consensus that another substantial stressor for international students was due to social interactions with other students, teaching assistants and professors. Students described experiencing new social norms, new customs, new people and distinct points of view at the university. Students were accustomed to feeling excluded, ostracised and discriminated. Students described many instances where they felt unwelcome or disrespected by classmates and even by academic and support staff. For example, Ashley explained feeling excluded by the other domestic students:

> *"Not everyone have been friendly there's some people that are peers that are kind of exclusive... like they go to parties and they don't want me there or they don't tell you. They tend to be domestic students but I don't want to trash them but maybe they're not really comfortable with having fun while having friends that are different. I accept that and I respect that but it has been a couple hurtful incidences... but that just small part of the whole experience."*

Tanya also expresses her concern with respect to trying to connect with other students and creating more friendships on campus.

> *Most of the time I hang out with two girls from my building, that are from Canada, they are from Ontario that I'm really tight with but is a limited social network. I wish it was larger, most of them are also in the same program, like five of them are in political science together and I'm doing psych and linguistics so my course load is different so I don't have*

anyone to go to class with, I wish there were more ways to meet people in class and kind of maintain that relationship, which I'm working on right now. So I do have a few friends from the program but that is just happening for me right now, it took two years for that to happened.

While students stated that they were excited to meet new people and expose themselves to the new culture and customs, this was also often a source confusion, isolation and preoccupation. Kevin and Mary described the social challenges:

"I meet some people that are really different for me, and they have their own ways of thinking, so if they have really different views from mine, it's really hard to socially interact with them, so that was the most difficult part." (Kevin)

"I feel is has been harder for me to meet Europeans or people from the international community, either because they segregate themselves or they are so few from them. I joined the Italian student association, but it wasn't actually Italians, it was people hoping to learn Italian or from Canadian descent so they didn't speak the language or the culture is different." (Mary)

Most of the students migrate on their own and do not have family or an established social network in the new country. Students expressed feeling obligated to go out of their way to find social connections but due to the high academic stress, they find it challenging to manage their social life with the academic demands. Alonso described this balance:

As an international student you kind of start from zero from your social network. So, everything you do is a progress. In my first year my social network was really my lab mates

and roommates. I had very few other friends only really from the last year because it's difficult to go out from that circle from your roommate in your lab and the friends of your lab mates and the friends from your roommates.. sort of that's the maximum extent too.. so yeah I did try to engage with a few clubs and volunteer.. I did some make friends there but it's difficult to follow up, so they sort of become kind of acquaintances.

Finally, students expressed the challenges with integrating with domestic students on campus. Most of the international students reported that their friends were international students, such as Jane mentioning "*I also feel that most of my friends are all international students I haven't interacted a lot with domestic students yeah"* and Felice stating:

"My social group, is formed by other Indian friends (international students), even in class I'm friendly with all types of people but going out and hanging out with people I go with Indian friends…I had other friends as well, Canadian friends but the home feeling and I think language plays a pretty big part for me. With my international friends, I can speak my own language and I can feel I can express myself better. I feel they were also going through the same thing (Indian friends) with their families back home and they are all international students"

Generally, students were able to describe many instances of how social stressors became a major source of preoccupation for them. Social challenges can affect them both in and outside of the classroom, and appears to affect all students differently. Students described that they felt it was necessary to be proactive in the development of social relationships and respond to socialization challenges in a timely manner. They described that if these challenges were not resolved

adequately, they could lead to students feeling isolated, feeling lonely, and homesick. Finally, students expressed challenges in trying to engage with domestic students and most of them actively sought out opportunities to meet other students on campus.

*Perceptions of Inequality & Discrimination***.** Many students felt they were at a disadvantage while accessing resources on campus (scholarships, grants, work). Specifically, they mentioned many resources are only accessible to domestic students and they generally argued that if they are on campus and paying tuition, they should have the availability to access and apply to the same opportunities as domestic students. Henry described his experience:

> "There is a lot of focus on other areas like equality, equity, LGBQT, sports, academics, career counselling, but I don't know, I haven't really experienced any effective support for international students. I was once rejected by, I think it was a financial counselling office some sort of office where you get financial counselling… because I was an international student, they said they don't have any counsellors to meet up with international students. That also included 30 to 40 minutes of waiting to speak to the person and at the end of the conversation, I was rejected." (Henry)

Students also expressed feeling that the services they are receiving at the University do not match, in value, the high tuition that they are paying. Jane said the programs and services did not meet her expectations, and Anna described that the services did not seem to be of value: "*You are paying for them but… who is using it? In terms of the fees that we pay, I feel like the services are not up to the standards. I'm not exactly sure how much but my parents paid." (Anna).* Also, students felt that there was limited information directed at international students: *"I feel most*

programs are more targeted towards domestic students or students that know more about [city] and Canada" (Jane). As Jane went on in her interview, she spoke about a general lack of resources on campus for international students. This thought was echoed by Anna, who mentioned that even within the dedicated centre for international students there are "*a lot of services but people don't know about them and even though they are there, no one is using them."*

Students also consistently reported feeling frustrated while trying to access health and mental health resources offered by the institution. Many of the students reported feeling unsatisfied by the wait times to get the help they needed and a general confusion by the process in how to get the help they needed. Specifically, many of the students also mentioned they did know if they would qualify to access any mental health services since they were internationals students. Jane described some of her frustration with the health care system for mental health needs:

> *If you want to see a psychologist or someone you have to wait at least couple of months before they can see you but if you have an emergency and you want to see someone tomorrow you cant… and when they referred you off campus clinics they don't make it clear that you need to have your UHIP [local health card]. I know in January or February I wanted to see the doctor and I didn't know the appointments go out really fast in the morning and I called maybe in the afternoon and they told me, "nothing is available" you should go to a walk-in, so I went. They told me in the phone these are the ones you can go to and I went and they said they don't see international students unless you pay upfront. And I don't have that kind of money to pay because is very expensive and they don't make*

it very clear, which clinics accept your insurance, so is very hard, because I went and I wasted my time.

Tanya also describes challenges with seeking medical help:

Accessing health and wellness as an international student you need to wait two weeks for an appointment, so let's say I'm facing a problem or a particular health concern, I don't want to have to pay to go to a walking clinic because I can show them my UHIP and most places accept them but I still have to pay (co-pay) which is in addition to the UHIP. Which is not a big amount, normally $10 to $15 dollars and If I need a doctor's note and then I pay for that as well, so overall going to a walk-in clinic will cost me $30-$40 dollars. Whereas being at [university] I shouldn't have to do that, the waiting times are really high or you need to come directly at 9am which is not a possibility as a student a lot of the times, because you have class, you have work or something like that keeps coming up…which It means that I have pay out of pocket if I actually need help whereas the university has those resources but I cant get to them.

The wait times to seek health support were a major barrier for these students, as well as the financial commitment needed to seek help. The majority of the students felt disappointed and disadvantaged in trying to access resources and services on campus. Some of the students felt, that due to their student status they had to overcome more challenges to access the same services than domestic students. Moreover, students expressed that programs that were supposed to target international students were not promoted adequately to them or did not catch the interest of the international student community.

Overall, international students identified specific situations and reasons that caused stress to them. While not all these stressors uniquely affected them, the fact that many of these international students felt that it is more difficult for them to access resources to de-stress is concerning and in need of further investigation.

Adaptation: "*So it was the first time being away from home and family, I have no family here. So I was excited but at the same time nervous because I didn't know what to expect". (Felice)*

The international student adaptation process seemed to differ among students. Many students, and in particular those who had completed at least some high school or preparatory school abroad, started feeling adapted from the onset while other students had a more difficult adapting to their university life. The most common challenges to adaptation were related to: academic demands, weather, food, and living arrangements. For example, Mary describes her first semester in the university:

> *"First semester was kind of tough, in terms of getting adjusted, not so much in terms of the workload because I haven't dived into that yet but sort of the expectations on me and what I put on myself, and the fact that you need to apply to post after the first year, which is different from Europe. Having the first set of finals that's always stressful and is pretty hard to meet people even in res or that's my experience. First semester was kind of more difficult in living alone, adjusting to new people. The structure is different from high school when you had designated times to socialize after every class."*

Felice, a student who was studying abroad for the first time, explained some of her challenges to adaptation showing the differences between cultures:

"In India we don't write essays or assignments, so I remember when I had a project I used to copy and paste everything from Wikipedia (laughs), that's what everyone used to do, you know. Here, when I had to write my first essay, I literally copied and paste everything from Wikipedia and obviously (laughs) I got a call from my professor, asking me, what is this (laughs)? You have copied like 90% of the paper, and I was like "I'm not used to this"… I didn't know what a citation was, what APA [American Psychological Association] was…With essays and assignments I still struggle with that, I have to start much earlier because the whole concept was new for me".

Two sub-themes summarize these findings Trepidation Adaptation and Comfortable Adaptiveness.

Trepidation Adaptation. Students expressed feelings of hesitation, anxiety, and concerns before arriving to campus. Most of these feelings were generated due to the anticipated academic rigour associated with this particular higher-level institution. Kevin described his feelings prior to arriving on campus: *"I was really really excited but I was also somewhat worried because I heard many people saying that [university] is a really hard school, so you have to work really hard in order to graduate".* Mary had similar worries before attending the university: *"I knew the country and the society was welcoming but I also knew [the university] was very rigorous academically institution and I was unsure about the ratio between international students to domestic. I didn't know what to expect…Probably, socially I was the most unaware".*

Other students were worried about their adaptation to the community and whether they would have the necessary skills to adapt to the campus environment. Jane described some of this

trepidation: *"I was very shy and I was trying to figure out what I wanted to do in university, in terms of the program and the classes. Also, sometimes I felt that people would not understand what I was saying".* Furthermore, students discussed the unknown of even simple responsibilities and fear of not fitting in. Julian described his focus on how to do laundry as an example of even the simplest tasks needing attention and learning:

> *"Whenever one of my friends was going to do laundry, I'm like.. 'I need to learn'. My strategy was to keep talking to them (friends) and pretend that I'm not here.. and, that's how I learned how to do laundry after two days of observations … but, yeah that was kind of the process. It was a bit embarrassing. Like whenever I ask how to do something, friends would say: "you don't know how to do this?' and I'm like 'no…'. So I guess I was stressful in a way that what others might think."*

Some students described having mixed emotions about studying abroad and arriving on campus. As well as having challenges adapting to the city, they felt that their expectations were different from the reality. Rashford described his mixed emotions:

> *"Is actually a mixture of everything, I come from a town in India, that is not super famous, not the capital. I have never been out of the state let alone the province, I have never been out of the city, never left my friends or family. This was a big move, moving across the globe, I was nervous, anxious but at the same time, I was expecting new stuff to happen in my life. It was a huge shift from where I am from and culture I came from. When I was in my country I loved the western country, so I was okay when I got here, comparing myself with other Indian people."*

Jane described how she was excited about her move but soon realized she was not prepared:

> *"At the beginning I was excited about my classes, to experience new culture but coming to Toronto you don't experience a new culture.. Instead you experience a culture shock that's what happened to me. And there's no Canadian culture that I have experience, I have experience Chinese culture or like other types of cultures because I have friends from these countries"*

Most of the student's initial challenges to adaptation were generally short-lived, through the first term or year of university. However, some students did mention that these challenges persisted throughout their student careers. As May describes, "*Now I have a different mind set and I realized my friends feel the same way, so now, we feel we can make it work, there are opportunities to go out and meet people and manage our courses."*

Students expressed trepidation due to their initial adaptation on campus. These adaptation challenges varied amongst the students but the majority expressed tremendous concern regarding their anticipated academic performance as well as their social adaptation on campus. They also expressed issues with respect to their expectations versus the reality of different experiences encountered on campus.

Comfortable Adaptiveness. For the students who reported little to no challenges with cultural adaptation, it appeared they were not new to the process having completed high school overseas or an International Baccalaureate program in their home country which prepared them academically. Ashley explains her experience: *"It hasn't been that hard because I previously went to school to another Western Country. I'm kind of used to the way of living on res and how*

everything works.. here, I have more opportunities to take advantage of." Alonso had a similar perspective: *"Academically it wasn't that different because I study in a college in India which follows a very North American way of teaching. So my undergrad was very similar curricular wise and all the professors are trained from North America academically the adaptation wasn't that difficult."* As such, there were certain challenges for students who were adapting for the first time while starting university whereas the students who had similar academic or social contexts appeared to feel adapted very early in their transition to university.

It seems as though having a previous experience studying abroad or having a program that prepares international students academically does seem to help some students with their initial adaptation. In summary, students all had different initial experiences while adapting to the university life. Students had trepidations due to their adaptation process and most of their preoccupation originated from the anticipated academic demands and their expected social life on campus. Moreover, some students had initial expectations with regards to their initial adaptation and many times those expectations were not reality.

Self-Care: *"There are a lot of resources available to you, provided that you take advantage of them." (Ashley)*

International students were able to identify the importance of self-care both for physical and mental health. While most of the students are aware of the mental health resources available for them on campus, the majority of the students were trying to cope with their emotions or challenges on their own. Self-care included distraction and self-talk, physical activity, mental health counselling, and social support.

Distraction and self-talk. Students reported using distraction techniques or trying to stay occupied to overcome negative feelings and stress but also expressed a general understanding that this was not an adaptive strategy, as Felice said:

> "*That's the thing, if I make myself busy, I don't think about too much but that's no solution. I know that is not a solution to keep making yourself busy, what happens if you are not busy? I'm not too sure…Sometimes, I do feel like going [to talk to a counsellor], sometimes I tell myself, is fine, I'll just kept myself busy and it will be fine…"*

And Kevin also described talking himself out of additional coping strategies: "*I thought about it (seeking mental health guidance) but I never looked for it…I sometimes get kind of depressed and I was actually thinking of going to looking for some mental health care and stuff like that… but nah (chuckles) I'm okay."* Many students generally expressed these experiences of distracting themselves from their own thoughts, or talking themselves out of seeking help.

International students engaged in distraction/self-talk strategies to momentarily avoid stress reactions. However, most students were aware that these techniques were not permanent solutions to their challenges and many students actively sought extra help once they felt their initial resources were no longer effective.

Physical activity. Many of the students mentioned that they are currently engaging in physical activity already or they would like to engage in physical activity in the future. They perceived physical activity as a distraction or a break from their academics or as way to connect with other students and make friends through sports. Physical activity was also perceived as a means to maintain a "healthy weight" (*Felice*) and used as a "de-stress" (*Alonso*) activity. As

Henry describes, *"It's [physical activity] definitely keeps me in check whether it's physical, it keeps me in condition. It also keeps me psychologically healthy. Physical activity is the only time I find myself not thinking about anything. I'm only thinking about what I got to do in the present moment and I think that's very stress-relieving. I think it's because I've been training for a while now so it's very meditative. It allows me to practice self-control."* Unfortunately, due to the high emphasis on academic success, physical activity was described as one of the first strategies to be eliminated when things become too challenging in school. Alonso explained his experience with physical activity: *"[Physical activity] Is needed.. is much needed for a graduate student. Is really easy to ignore because of all the stress going around and it just goes down in our priority list as soon as school starts to get more difficult."* (Alonso). Physical activity was also used by Tanya to achieve and maintain a healthy weight. She described her relationship with physical activity, "*between first year, there was the obviously freshman 15, the kind of sleeping off the clock, eating whenever you feel like, so maintaining some kind of routine so the fitness aspect. I was working towards a final outcome which I want my body to look a certain way, I'm happy with it now but I liked it to be fit also, so in that aspect I enjoyed physical activity, I want to do it"*. Also, a few students have not engaged in physical activity because of a lack of comfort on campus among athletes and advanced exercisers. They felt that they did not have the physical strength or experience necessary to partake in sports or they felt their fitness level too low comparing to other peers. Jane describes the gap between knowing physical activity is beneficial but not participating: *"Physical activity, I think is a good thing, but me personally; I tried to find time to do it but is not on my priority so I haven't done a lot of found what I really want to do…I feel is intimidating because you are not at the same level at other people, when they are doing 10 bench*

presses and you are only doing one. Is like okay (laugh), you know?" Tanya also explained feeling intimated to start to engage in physical activity:

> *"I definitely feel, I don't want to say stigma because is negative but at least internally I feel some kind of pressure specially if I have to a try out or something like that, that was more people, even the people I know that went for intramurals or part of varsity have been doing it for a really long time. When the rest of the participants are like that it also puts you in a slight disadvantage, because not everyone is at this calibre, you know. Automatically, you are a bit lower in the list of capabilities, something I'm willing to build on but since the beginning you don't have the same calibre as everybody else is less likely you make it to the next round. That has also prevented me to going to try outs in some cases".*

In this way, students demonstrated some understanding of the benefits of physical activity. However, they also felt different than others and not at a level which would allow them to fit in within the gym community. Although the majority of the students expressed that they would like to participate in physical activity, but some of them do not feel they have the necessary skills to participate or are intimidated to use the athletic facilities. Finally, physical activity is perceived as a time-consuming task, therefore it is not identified as a priority for many students. Many of them feel that they are not able to allow themselves to spend time and enjoy these kinds of activities while leaving less time for their academic demands that are their number one priority.

Mental Health Counselling. The majority of students also perceived mental health counselling as an effective strategy of self-care. Most students have contemplated seeking

mental health counselling to help them deal with stress, anxiety and other perceived challenges. As Felice first describes: *(Mental Health services) the benefits are to help students, to make university life easier. I feel we are already stressed because of school and they just want to have a more holistic approach".* Mary also highlighted that she would use mental health services on campus if she needed them: *"Probably, If I'm having a crisis of confidence, which normally happens because of grades, or if I feel I was having a more existential crisis. I've been lucky not to have experienced any eating disorders in my life, depression, anxiety, I haven't had anything of that yet. So hopefully, not for those reasons".* And Anna discussed the perceived challenges of mental health services on campus: *"I haven't heard good things about it. So like I haven't actively gone to seek an appointment.. but if I wanted to seek help for mental health, I've been told, there are very long wait times. Like If I were to think, I would still be on the waiting list right now [2 months]."* These examples demonstrate awareness of resources on campus, and some of the challenges of the services.

Students also mentioned that they wish they had sought for help sooner and it seems students tend to wait until they feel extremely overwhelmed before they seek help, as Teresa, describes her experience: "*The moment you see a problem coming up go running and seek help. I waited two years to get accessibility, when that made my life so much easier and I was like agh!!.. and I should have done it initially and understand the procedures to seek for help".* However, it seems that friends and social networks appear to influence the perception and willingness to pursue mental health guidance. Ashley spoke in general about how people try to deal with mild mental health issues on their own with friends and "*most people will not really seek help unless they are*

feeling really bad'. Friends were part of the coping repertoire and also helped guide students to help when needed, as Rashford described:

> *"At the beginning I didn't know, if I said something I would get help or people would talked to me about it, whatever I'm going through but a friend that she is from India as well, and she studies here as well. She recommended me to go and talk to a professional counsellor, and talked to the health and wellness, because I'm in UHIP if I go outside the university, they will charge me a lot. That's when I decided to go and seek help". (Rashford).*

Students perceived mental health counselling as a helpful self-care tool but it was only use as a last resource, when students felt very overwhelmed. Friends and social networks seem to be a very important influence in the student's decision-making process to decide whether to seek help. As pointed out earlier, once students had decided to seek help, most students were dissatisfied with the usual long wait time to obtain the desire help.

Social support. Students reported the importance of connecting with other international students or other students of the same nationality as them on campus. They reported that having other students that are going through the same process and experiences as them was extremely helpful, as they felt they could relate with them. These also helped them to socialize with other international students and having a notion that they were not alone, and that other individuals were going through the same experiences. Similarly, it was also reported, that having other students that spoke the same language as them was a valuable resource to navigate the college environment. As they would be able to ask questions in the language they felt comfortable speaking. Henry is a Korean student who explains his experience on campus:

"What's very good at [University] is actually a community of Koreans where knowledge, resources are shared. It provides a more welcoming experience to students because without this resource, it will be very difficult for me to go out there and find it on my own. I've had many experiences where a Korean friend of mine was already enrolled here provided insights and resources with the school and that has helped with tips academically, with registrars, even with sports, I had opportunities to engage in intramurals. It would have been very difficult for me to engage in a team where I did not know anyone but because a community was already established and the bond I had with the team, I felt more comfortable to join the team."

Alonso also explains the value of international student social support *"…with International student the connection is almost instant.. with domestic students it could be that they really don't understand.. but I've been fortunate enough to meet a few who are willing to put in the effort and energy to sit and understand what's going and sort of draw analogies to their lives."*

Students that were living on campus also stated that the college dons and a dedicated campus designed to help international students, were useful social resources. In addition to hosting events and workshops, Jane discussed the importance of the Centre: *"They give you all the resources that are available, especially in terms of medical in case you need to go to the doctor or talking to your professors in terms of assignments and other things as well."*

Overall, students found it helpful to develop friendships with other international students; especially with students who speak their same language and similar cultures as them. Moreover, resources and events created by the institution and which are uniquely available to international

students in turn create social opportunities for them to connect with and engage with other international students. Although not unanimous, some of the international students would like to have more opportunities to engage with domestic students on campus.

Discussion

This study's aim was to explore international students' perceptions, and experiences regarding their adaptation, physical activity, and mental health on campus at a large Canadian university. Based on the results, international students are encountering several cross-cultural, adaptation and organizational challenges that prevents them to access to institutional support on campus and engage in extracurricular activities on and off campus. Main themes that emerged from the inductive thematic analysis included factors related to perceived stress, initial adaptation and expectations, and self-care. From these themes, international students expressed having a good understanding of their challenges and actively sought out help as needed. Contrary to previous research (Hyun, Quinn, Madon, & Lusting, 2007) there seemed to be less stigma coming from this group of students when seeking out mental help as needed.

Perceived stress included financial concerns, social stressors and perceptions of inequalities and discrimination. Prior to arriving to campus, students express having trepidations due to the expected academic demands, lack of social network and adaptation on campus. Similar to documented evidence (Altbach & Knight, 2007; Deri, 2005; Robertson et al., 2000), these fears declined for many students over time but for some of them these preoccupations became real stressors and challenges throughout their academic careers. Moreover, international students who had prior experiences studying abroad or had taken academic preparatory programs with a western style of teaching, reported adapting better to the school

system and having an easier transitional period to the new culture. To a certain extent this might explain some of the international students' learned independence and open-mindedness, as well as more successful adaptation in their Canadian endeavours (Hadis, 2005). Nonetheless, evidence on international students financial constrain builds support for previous research in the perceived barriers for international students (Rienties et al., 2012). This is an important factor to recognize, as researchers suggest that the lack of financial stability might have an impact across other domains, such as healthy nutrition or participation in sports activities (Quintiliani et al., 2012; Salmon et al., 2003;). Therefore, the economic environment of international students should be studied further as a barrier to their physical activity engagement and other recreational and social endeavors.

Unlike other research that shows a language proficiency is often reported as a barrier for international students (Hayes & Lin, 1994; Zhang & Mi, 2009), language did not emerge as a major barrier to participation and adaptation on campus. It may be that the sampling strategy precluded an understanding of language as a barrier, since all participants were required to understand and speak English. Although language was not indicated as major barrier, students did find it beneficial to be around other students that spoke the same language as them and this social support was valuable for mental health. Socially, international students expressed having a difficult time trying to connect with other peers, and felt they needed to put extra effort in order to create a strong social network. They also expressed wishing to have more opportunities to engage with other domestic students. This is an important finding as previous research has found that international students who experience high acculturative stress but have a high level of social support would express lower indices of mental health symptoms (Lee, Koeske, & Sales,

2004). Therefore, it is important to recognize the need to foster strong social networks within the international student community. This is an important fact to note, since previous research conducted in other acculturative groups has been shown that social support is related to accessibility of primary healthcare services (Lum, Swartz, & Kwan, 2016). In the current study, international students expressed that access mental health care was heavily influenced by their peers and peers are important to navigate health services (Deri, 2005; Talbot et al., 2001).

Participants in this study had a favorable perception regarding physical activity and sports, and they were already active or planning to become more active in the future. While many students discussed benefits of physical activity, some of the students also felt intimidated to participate in physical activity due to the lack of comfort amongst other participants and the perceived lack of skills to participate in physical activity. Moreover, due to their academic responsibilities, most of the students did not see physical activity as a priority. These findings align with evidence from the college student population, where the perceived lack of time, competence, and academic priorities are amongst the main perceived barriers to physical activity (Arzu, Tuzun, & Eker , 2006). This suggests that international students have some similar challenges to their domestic peers at becoming active. This study also found that physical activity could be a potential coping strategy for international students to deal with the acculturation stress. For many students, physical activity acted as a distractor from the rest of their problems and this finding is supportive of a commonly accepted hypothesis regarding physical activity as a tool to reduce mental illness (Barhrke & Morgan, 1978; Craft & Perna, 2004; Paluska & Schwenk, 2000). Physical activity was also described as a gateway to make friends and connect with other students. This is an important observation, since previous evidence suggest that international

students struggle to connect with other peers on campus (Yeh & Inose, 2003); the literature also suggests that international students who can create friendships and connections with domestic students experience less acculturative stress symptoms (Poyrazli, Kavanaugh, Baker, & Al-Timimi, 2004). Therefore, physical activity could act as a medium for students to connect with other peers and connect with the campus life. Tailored health promotion initiatives are needed to enhance participation in subgroups of campus life, including international students, and physical activity may be foundational to these initiatives. Based on the current findings, these health promotion initiatives should focus on ways to improve academic performance, transition into campus lifestyle, and opportunities for extracurricular activities on campus.

Additionally, international students expressed high academic stress and pressure that limited their perceived time to participate in extra-curricular activities such as physical activity. While the students did not make a connection in how physical activity could improve their academic performance, there is a wealth of evidence supporting the benefits of physical activity towards improving academic performance by increasing cognitive performance (e.g. increase attention, reading accuracy, increase verbal working memory, increase memorization) (Bailey et al., 2009; Chang et al., 2012; Ploughman, 2008). Physical activity could be a tool for these students to improve their academic performance, while getting all the physical and mental benefits (Anderson & Geetha, 2013; Deslandes, et al., 2008) attributed to physical activity at the same time.

Limitations

This study is not without its limitations, for example, due to the self-selected recruitment method and recruitment process, the study may have attracted the more motivated participants

that wish to share their experiences on campus, thus, there is a selection bias. Nonetheless, the experiences of these students are valuable for understanding the barriers that international students face on campus. Since participants in this study were all from a large Canadian university in a large city, these accounts are not indicative with the experiences of other international students and the purpose of qualitative research is not to generalize the findings.

Conclusions

Higher education institutions continue to be committed to increase their international recruitment efforts. Consequently, it is imperative to identify international students' current needs and barriers so that these students have a meaningful university experience. Based on the current findings, international students experience adaptation challenges that may not be long lasting, however at times require support. Physical activity was perceived as a positive tool to deal with stress and mental health predicaments for international students, and physical activity could be a potential coping strategy for international students to deal with the acculturation stress. Overall, when compared with domestic students, international students continue facing unique acculturation challenges which hinder their experiences and adaptation on campus.

Chapter 4

General Discussion

Canadian institutions' desire and commitment to maintain and increase international student recruitment continues to be high (Knight, 2000). However, it is important to note that international students have additional stressors, due to their acculturation challenges. In addition, these acculturation challenges can in turn result in symptoms of acculturation stress if not addressed properly (Bai, 2016). Furthermore, studies report a mental health epidemic at the college level, which has led to increased efforts in providing effective services to help these students (Hunt & Eisenberg, 2010). While physical activity may be one such way to do so, there is a lack of research regarding international students' current levels of physical activity and sport participation on campus. As such, the current study aimed to investigate international student's experiences of, and relationships among, physical activity and mental health. Specifically, the purpose of this thesis is to describe international students' patterns of engagement in physical activity and mental health activities at the University of Toronto, to examine the relationship between physical activity and mental health within an acculturation framework, and to explore international students' experiences with physical activity and mental health on campus.

To address these study aims, two different studies were conducted. Study one aimed at characterizing international students' levels of physical activity and reports of mental health and stress, as well as examining the association between stress, physical activity and mental health in an acculturation framework. Overall, this study showed that physical activity has the potential

to alleviate acculturative stress symptoms in international students, however, when compared to their Canadian peers, international students have similarly low levels of physical activity. In addition, they showed similar high stress and mental health levels. These findings are consistent with the literature in where university students experience a great level of stress and mental health decline during their university years (Auerbach et al., 2018). While these levels are comparably low between the two groups, domestic students reported slightly higher levels of stress, symptoms of mental illness, and higher levels of mental health and physical activity than international students. These findings might provide some support that the Healthy Immigration Effect (HIE) might be taking place amongst international students. HIE, is the concept that immigrants tend to have better health than their native-born counterparts do in their new society, but this advantage in health status decreases as their residence lengthens (De Maio, 2010). There is a wealth of evidence that suggests that HIE is seen in adult and adolescent immigrants alike (Kwak, 2017). HIE has been studied predominantly with recent immigrants, to date it is unclear if this phenomenon also applies to international students.

Study two was designed to explore international student's experiences and perceptions regarding their adaptation, physical activity, and access to mental health services at a large Canadian university. This study provided insight on possible reasons for why international students presented low MPVA levels and high stress and mental health concerns. Some of the challenges and barriers that international students experience on campus were elucidated. For example, international students had favourable perceptions for physical activity and associated benefits yet due to challenges such as lack of time, financial concerns, social and adaptation

challenges to a new school system, prevented these students from becoming involved with sports or physical activity on campus. Participants expressed feelings of incredible pressure to excel well academically (usually self-imposed) as they are paying a high tuition amount to be able to study abroad. Due to these demands, students devote most of the time to academics and hence, extracurricular participation became secondary. However, students who were already participating, were using physical activity and sports as a distraction and a way to de-stress.

Other barriers that international students experienced were related to challenges to access health, mental health resources availability, and adaptation challenges (e.g. adapting to new culture, navigating a new school system, living away from parents, etc.). Most of the students expressed many instances in which they experienced sadness, loneliness, depression, homesickness, and anxiety due to their adaptation process. While many of the participants tried to seek out mental health support, not many of them were successful at getting the help they needed on a timely manner. Students also expressed experiencing exclusion and discrimination, although these instances were not common and not experienced by all the participants. Students felt that they should have the same advantages as domestic students to apply and access resources (employment, scholarship, internships) on campus equally. These challenges and barriers that international students are experiencing on campus, could explain some of the potential reasons why international students are having high levels of stress and negative mental health outcomes as well as low engagement with sports and physical activity.

Theoretical Implications

This research makes some important contributions to the literature by exploring physical activity as part of an acculturative framework. As a wealth of evidence demonstrates, physical activity

can be an effective tool to improve mental health markers, decrease mental health symptoms, and improve self-esteem and well being (Anderson & Geetha, 2013; Buckworth & Nigg, 2004; Hamer, Stamatakis, & Steptoe, 2009). Current acculturation frameworks focus on psychological outcomes but failed to show how physical activity and self-care techniques (mental health counselling, social network) could play a role. Additionally, most of the current acculturation models focus on immigrants, refugees, and asylum seekers. However, as observed in this study and supported by the literature (Hyun et al., 2007; Mori, 2000), international students are a unique group due to their 'transitional" state and face different challenges that must be considered in research. As Steiner (2009) identified, the type of acculturation options a migrant has may vary according to the conditions surrounding their migration (i.e. voluntary migration, refugees, etc.) and should be considered in research. Moreover, Schwartz et al. (2010) suggested that multidimensional approaches should be favoured over unidimensional or bidimensional ones when studying acculturation and health parameters. Some argue that acculturation is already a multidimensional approach based on the cultural conflict that individuals must face while entering a new society; when components such as language, tradition, and social ties are at risk of facing changes due to the acculturation process (Schwartz el al., 2010). Consequently, it would be recommended to study acculturation from multidimensional approach, and take into account how physical activity and self-care strategies can impact this process and the psychological outcomes of international students. Moreover, another limitation of this study was the focus of only one theory without further examination of other options to explain the studied phenomena. It would be recommended to explore other theories in future research to help understand international students' physical activity engagement. Some examples may include

the stress process theory or the socioecological model. The stress process theory, presented by Pearlin et al (1981), includes the roles and interrelationships among three major concepts: stressors, mediators (coping resources), and distress or health outcomes. Their model explains how social stressors vary significantly amongst individuals and social groups, as well as how these variations are caused by social and psychological coping resources. Studies in many disciplines have provided evidence supporting this model, including research with immigrants (Haley et al, 2004; Noah & Avison, 1996). In this case, physical activity could be presented as a coping resource to improve mental health outcomes. Another theory which could further explore physical activity engagement in international students, would be the socio-ecological approach (Bronfenbrenner, 1977). This model focuses on the interrelationships between the social, physical, and policy environments (Stokols, 1996). The model emphasizes that health promotion should focus not only on intrapersonal behavioral factors, but also on the multiple-level factor that influences the specific behaviour in question (Mehtälä et al., 2014). Therefore, in the case of physical activity and international students, the socioecological model could integrate the multiple level factors which may influence physical activity for an international student. The socioecological model suggests that both, individual-focused and environmental-focused strategies, can be applied to healthy behaviour change (Stokols, 2000). Furthermore, a number of behaviour change and motivation theories could be integrated with social cultural frameworks to best understand behaviour. While a review of these theories is beyond the scope of this thesis, theory of planned behaviour(Ajzen, 1985), self-determination theory (Ryan & Deci, 2000), and expectancy-value models (Eccles, et al., 1983) incorporate social and personal factors that may be important to understand international students' lifestyle behaviours.

Methodological Implications

Within this study, there were two main measurement issues, which can be used to inform research in this field in the future.

Measurement Scales. In the first study, data from the ACHA-NCHA II were used as measurement scales for the variables of interests (stress, physical activity level and mental health). Although the ACHA-NCHA has been tested for validity, reliability, and contains significant empirical evidence to represent the college student population (Douglas, et al., 1997), the data may not be representative of US and Canadian colleges and universities alike, and therefore caution must be taken when generalizing the results. Moreover, the questionnaire was not designed to be a comprehensive physical activity, stress, or mental health measure, and as such, it provides a general overview of these self-reported measurements among students. However, in order to obtain objective measures of the variables of interest, superior measurement assessment tools should be used.

Tools such as accelerometers (i.e ActiGraph GT3X+) should be used in order to measure physical activity levels. These tools have been shown to be both valid and reliable in the measurement of physical activity levels (Fitzgerald et al., 2015; Haydn, Fitzgerald, & Routen, 2015). In addition, accelerometers can provide other insightful information regarding physical activity behaviour, including the amount of time an individual spends completely sedentary or the amount of time spent at a specific level of intensity (Fitzgerald, 2015). As such, this type of tool should be utilized to assess physical activity levels, specially since there are reports of individuals over-reporting subjective assessments. In addition, it is reported subjective measures

of MVPA levels tend to be higher than objective measures, specifically on inactive participants (LeBlanc & Janssen, 2010; Oosterom, et al., 2018).

In this study we used a general stress variable to capture acculturative stress, instead of using a more appropriate tool to measure acculturative stress. This is important to note since acculturative stress refers to the stress that individuals undergo directly as result of their acculturation process (Berry, 1990). Therefore, for international students, it would be recommended to use the Stress Scale for International Students (ASSIS). The ASSIS scale was developed specifically for international students and may be a more appropriate tool to examine acculturation stress (Sandhu & Asrabadi, 1994). The ASSIS, consist of 36-items, and comprised of seven subscales assessing (Perceived Discrimination, Homesickness, Perceived Hate, Fear, Stress Due to Change/Culture Shock, Guilt, Nonspecific) and revisions to the scale also assess potential sources of stress (Mubeen & Kroner-Herwig, 2015). Therefore, future research should consider using such tools to measure acculturative stress in the international student population.

For mental health, simple items were used to capture positive and negative symptoms. Nonetheless, it would recommended to use assessment tools such as the Counselling Center Assessment for Psychological Symptoms (CCAPS), an instrument created to assess mental health predicaments in the college student population. The CCAPS consists of 9 subscales and focuses on concerns specific to the college population. This assessment has been shown to have good reliability and validity (Locke, et al., 2012). Moreover, as presented in this study, mental health is considered a dual-factor model of mental health, in where well-being and psychological distress are two related but distinctive outcomes which contribute to mental health (Antaramian, 2015). Therefore, it would be recommended to use different measurement tools to measure positive

mental health versus psychological distress. Similar to the assessment of physical activity, future studies focused on international students could also benefit from objective assessments of mental health services and levels using clinician scored inventories and mapping health service use through student card.

Self-report. Social desirability is a challenge when using self-report surveys. It is also possible that certain characteristics of individuals participating in self-report surveys predict social desirability bias. In Miller's (2011) study he found that senior students displayed a higher degree of social desirability than first-year students while completing the National Survey of Student Engagement (Miller, 2011). Tests exploring measurement differences for domestic and international students should be conducted to explore if the measurement features (e.g., factor scores, variances, means, error variances, etc.) are invariant on measures such as those used in the current study.

Moreover, another problem of using self-reported surveys with the international student population is the possibility of a language barrier. As reported in the literature, language proficiency is a main acculturation barrier for international students (Sawir et al., 201; Sherry, Thomas, & Chui, 2010). Taken together, language and other nuances across culture might influence international student's understanding and interpretation of the questions and therefore influencing their answers. This has been demonstrated in health self-reported surveys, in where poor language proficiency was associated with poor self-reported health due to the lack of understanding (Pottie, Ng, Spitzer, Mohammed, & Glazier, 2008). As such, it would be recommended to use assessment tools in the preferred language of the students, or provide a

language proficiency tool, to ensure that the results from bilingual and multilingual participants can be accurate and reliable in the study of subjects regarding international students (Marian, Blumenfeld, & Kaushanskaya, 2007). Likewise, we were not able to measure cultural and social factors since they were not assessed in the ACHA-NCHA. These variables are important predictors that could influence acculturation, physical activity and mental health (Kramer, Kwong, Lee and Chung 2002; Bauman et al, 2012). However, these social and cultural factors are not easy to measure or define. Therefore, it would be recommended that these types of questions be included in future disseminations of the ACHA-NCHA survey.

Practical implications and Future Directions

Previous evidence suggests strong associations between physical activity and the reduction of psychological distress, and in certain populations, even a dose-response has been shown between physical activity and mental health (Hamer, Stamatakis, & Steptoe, 2009; Brown, Ford, Burton, Marshall, & Dobson, 2005; Galper, Trivedi, Barlow, Dunn, & Kampert, 2006). Based on the findings of the current study, physical activity might play an important role in an acculturative framework for international students. Nonetheless, it does seem that physical activity could be more important for domestic student rather than for international students. However, it is not year clear why this might be the case and it is important to highlight that the group of international student participants displayed very low activity levels. Only 12%, of these students met the MPVA levels of physical activity. Therefore, it would be advisable to study

international student's attitudes towards physical activity and further study their needs and barriers towards physical activity and sports.

While the low physical activity levels displayed by the international student group are aligned with research conducted in other acculturative groups, such as recent immigrants (Tremblay et al., 2006; Perez, 2002), there is no denying that efforts are needed to improve physical activity engagement. International students could benefit from the many advantages that physical activity generates, such as creating social networks, decreasing stress, sleeping better, increasing self-esteem, and a host of additional physical, emotional, and social benefits (Warburton et al., 2006). All these benefits might help students feel and function better and may decrease the need to seek out mental health resources. This in turn, could reduce the volume that mental health services are struggling to manage, thereby improving the efficiency, care, and reducing wait times for students who suffer from serious health conditions and who urgently need help to get better.

Additionally, it would be important to review the promotion and marketing strategies using in spreading information regarding programs focused on assisting international students. As Hawkins and colleagues (2011) highlighted in their research, health promotional campaigns should always include clear objectives and specific target populations for whom the campaign is intended. Furthermore, promotion initiatives should be tailored to the specific needs of these students (e.g. ways to improve academic performance, adapt to campus, improve physical activity levels, etc.) (Hawkins et al., 2008). It is currently unclear if these strategies are already taking place for international students. Based on this research, it does seem that it might be more

beneficial for educational institutions to create specific promotional campaigns and improve the availability of information aimed towards international students based on their needs.

Additionally, this study highlights the need for staff and faculty to be educated, as well as bring overall awareness of the added difficulties that international students face on campus. Instead of relying on the international students taking full responsibility to adapt to the new society, the institutions should be providing effective tools for these students to thrive and excel both academically and culturally. This information will allow staff and faculty to create better programs for these students and utilizing resources more effectively. Additionally, this information may indicate that a more tailored approach towards accessing mental health and physical activity may be needed for international students; instead of using the "one size fits all" approach that is normally used in most academic institutions.

Finally, institutions seem to have neglected having full understanding of the perception and experiences that international student have on campus regarding physical activity and mental health. Yet, this information is vital to ensure not only international students satisfaction on campus, but also to continue to foster international relationships between the host nation and the sending countries. If International students continue to experience high level of stress, mental health and continue to experience dissatisfaction on campus, their desire to study abroad might dwindle. Canadian universities must apply effort in order to support international students through the different adaptation challenges they experience. This is critical since international students are a unique group which provides the university with significant revenue. Appropriate resources, education, orientation, and support programs must be developed in order to provide a healthy and fruitful experience during students' academic life. In addition, the use of social

media has increased accessibility to information significantly. As a result, a damaging image of the university can easily be spread when students' experience is negative.

In closing, international students are a unique student group in need of tailored and targeted support from the university. While physical activity may not be a critical mediator in the experience of acculturation, it may be an important tool to improve students' experiences if attitudes and beliefs on the benefits of physical activity can be targeted. The success of international students is critical when considering the amount of effort placed in each students' academic career. Families, organizations, students themselves, and sometimes communities gather efforts to make this international experience a reality. It is the institutions' responsibility to ensure that the university and the community are prepared to welcome and support individuals from all over the world and ensure that the setting is appropriate for them to meet their goals and succeed.

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Appendices

APPENDIX A

UNIVERSITY OF TORONTO
FACULTY OF KINESIOLOGY & PHYSICAL EDUCATION

Participation Script

We are currently recruiting University of Toronto, International students who are currently registered at the University of Toronto for an interview regarding their experiences.

It has been shown that physical activity and exercise can lead to a myriad of positive benefits including physical and mental health benefits. However, little is known about International students' physical activity engagement abroad. We are interviewing international students to better understand their experiences and perceptions accessing health-related resources (e.g., Health & Wellness Centre, Physical Activity Centre, etc.) and services on campus. We are also interested in investigating International students' social networks, attitudes, perceptions, and motives toward physical activity and how they may have influenced their emotional and mental well-being. We are interested about hearing your experiences.

If any international students who are interested in taking part in this study, they will meet once with a researcher who will ask you some questions about your experiences as an international student. The interview can take place at the University of Toronto laboratory, or at a library – whichever participant prefers. This interview will provide you with a chance to tell us your opinions and your personal story as an international student. The interview will take approximately one hour and you will be compensated with $20 gift card for your participation.

If you are interested or know of any students, who might be interested in this research opportunity, please contact me. I will be available to hold an information session for those who are interested.

Please note that participants must be international students or refugees on a student visa, either of which do NOT have a permanent residency status in Canada.

For further information please contact Dong Hyuk (Chris) Park by email at cp.park@mail.utoronto.ca OR Dr. Catherine Sabiston at Catherine.sabiston@utoronto.ca

Thank you for your time,

Dong Hyuk (Chris) Park & Douglas Rosa

APPENDIX B

UNIVERSITY OF TORONTO
FACULTY OF KINESIOLOGY & PHYSICAL EDUCATION

Consent Form

Title of research project: Exploring physical activity and health opportunities and resources on campus for international students

Principle student investigator & Interviewer: Chris (Dong) Park, University of Toronto

Faculty supervisor: Catherine Sabiston, University of Toronto

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Purpose:

The purpose of this study is to examine international students' experiences and perceptions accessing health-related resources (e.g., Health & Wellness Centre, Centre for Addiction and Mental Health) services on campus. We are also interested in investigating IntS social networks and attitudes, perceptions and motives toward physical activity and how they may have influenced their emotional and mental well-being.

Study Procedures:

You will be asked to participate in an informal in-person interview with a researcher who will ask you about your current and past experiences as an international student navigating health related resources on campus and understanding more about your social network and perception's and attitudes about physical activity. The interview will be approximately one-hour in length and will be audio recorded, with your permission. We are interested in hearing your opinion and experiences.

Potential Benefits & Risks:

You may or may not directly benefit from participating in this study, however we hope that the information from this study may improve future international students' experiences for navigating health related resources on campus. If there are any questions you don't want to answer, you can skip them. If your emotions or thoughts regarding any questions in the questionnaire are concerning you or make you feel anxious or upset, we can provide you with resources.

Compensation:

You will receive a total of $20 gift card for participating in this interview.

Confidentiality:

All information in this study will be kept strictly private. Your interview responses will be coded with a pseudonym (i.e., a fake name) to maintain your privacy. It is completely your choice to participate in this study. You can choose not to participate or choose to stop participating at any time without explanation until the data analysis is finished, at which point the researchers will not be able to withdraw participant-specific information. This is expected to be approximately one month after your interview. Your decision to participate will not affect your access to any health-related resources on campus and you will still receive full compensation if you withdraw from the interview study at any time.

Questions & Contact Information:

If you have any questions concerning the procedures of this study or desire further information, please contact Dr. Catherine Sabiston by telephone: 416.978.5837 or email: catherine.sabiston@utoronto.ca. Participants can contact the Office of Research Ethics at the University of Toronto at ethics.review@utoronto.ca or 416-946-3273, if they have questions about their rights as participants in research.

DECLARATION OF ASSENT

A signed copy of this consent form will be kept by the researchers and you may keep a copy for your personal records.

I have read the content of this consent form, and I agree to participate in this follow-up interview study.

Your Name: _____ Date_____

Researcher: _____ Signature: _____

APPENDIX C

KPE495 Semi-structured interview guide

We greatly appreciate your participation in this study. Our main purpose of this study is to understand and examine the relationship between physical activity levels and mental health amongst international students at University of Toronto. We are also interested in your experiences with accessing services on campus. We will ask you to reflect on your attitudes and motives toward physical activity and how they may have influenced your emotional and mental well-being. We will also ask you to reflect on your thoughts and perceptions on health-related resources (e.g., Health & Wellness Centre, Centre for Addiction and Mental Health) on campus. There are no right answers to these questions. We want to hear about how you really feel which is very important to this study. If there are any questions that you do not feel comfortable answering, please feel free to skip them. The interview will go on for about 45-60 minutes and (Not sure about compensation for participation at the moment). Before we begin, do you have any questions?

1. Can you describe your overall experience in University as an international student?
    a. Can you describe your feelings before coming to University? Were you excited, worried, or anxious?
    b. How have those emotions/feelings changed since you came to University?
    c. What do you like or enjoy the most about your university life?
    d. On the other hand, what do you NOT like about your university life?
    e. Can you describe your adaptation process (it can be high-school to university, country to country)? What did you find helpful/ stressful during the process?
    f. Can you describe your living arrangements? (living on campus? Live with extended family?)

2. Can you describe your university experience in terms of social networking (e.g., friendship, participating in ethnic community)?
    a. What does your social network look like here in Canada (close friends, classmates, family, other international students?)
    b. What do you like about social networking?
    c. What do you NOT like about social networking?
    d. Do you feel like the university provides good social/institutional support for international students?
    e. If any, what was the most difficult part of the adaptation process in terms of social aspect of your university life?

3. Can you tell me about your leisure life?
    a. Can you describe the type of activities you do in your spare time?
    b. What are your perceptions towards physical activity and sports?

c. Do you know about the physical activities facilities and programs offered from University of Toronto?
d. How often you participate in physical activity/sports?
    i. If you do, what are the reasons why you choose to participate?
    ii. If you do not, what are the reasons you choose not to participate?
    iii. If you were to participate, do you feel there are enough programs that would cater to your needs?
e. If you have participated, can you describe your experience of physical activity or exercise or sports on campus? (e.g., intramurals, fitness, pick-up programs at AC or hart house)
f. In your opinion, how can these programs improve?
g. Can you describe your involvement in other clubs or activities on campus?

4. Can you discuss your awareness of any health-related resources/services on campus?
    a. Do you know about the health-related resources offered on campus?
    b. Have you ever thought of using health-related resources on campus?
        i. If yes, what are the reasons?
        ii. If no, why not?
    c. What do you think are the main benefits of the services provided on campus?
    d. If applicable, would you consider to take advantage of the resources/services?
    e. If not, what are the factors that limit or prevent you from using the health services on campus?

5. In your opinion, what are some solutions that you suggest/recommend in order to increase social and institutional support for international students? (To improve already existent resources/services on campus)
    a. If you know someone of an international student who is planning on coming to University of Toronto, what are some advice you would give them?

Appendix D

UNIVERSITY OF TORONTO
FACULTY OF KINESIOLOGY & PHYSICAL EDUCATION

Resources

Health & Wellness Centre at the University of Toronto

214 College Street, 2nd Floor

Koffler Student Services Centre
University of Toronto
Toronto, ON M5T 2Z9
(use the St. George Street entrance)

Phone: 416-978-8030
(phone line opens daily 9 a.m. - 4:30 p.m.
phone line closes at 4 p.m. in the Summer)

Centre for Addiction and Mental Health

If you need **emergency help**, please visit your local emergency department or CAMH's Psychiatric **Emergency Department**, call 911, contact a nurse at **Telehealth Ontario** at 1-866-797-0000, or a local **distress centre or crisis service**.

CAMH Main switchboard (416) 535-8501 or 1(800) 463-2338 toll free, staffed 24/7.

Distress lines

Operated by various agencies. When in need of someone to talk to. Open 24 hours a day (unless otherwise indicated).

Toronto Distress Centres (416) 408-4357 or 408-HELP
Distress Centre Peel 905-278-7208