PREDICTORS OF ANTIRETROVIRAL ADHERENCE SELF-EFFICACY AMONG PEOPLE LIVING WITH HIV/AIDS WHO USE ILLICIT DRUGS

by

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B.A., The University of British Columbia, 2010

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR
THE DEGREE OF

MASTER OF ARTS

in

The Faculty of Graduate and Postdoctoral Studies

(Counselling Psychology)

THE UNIVERSITY OF BRITISH COLUMBIA

(Vancouver)

December 2017

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Abstract

Although the benefits of antiretroviral therapy (ART) on the quality of life of people living with HIV/AIDS (PLWHA) who use illicit drugs have been well-described, sub-optimal adherence to ART remains an ongoing health concern. Positive health outcomes associated with adherence self-efficacy have been well-documented but there is a paucity of research exploring the antecedents of this construct. This study sought to identify possible determinants of adherence self-efficacy among a cohort of PLWHA who use illicit drugs. From December 2005 to June 2014, data were collected from the AIDS Care Cohort to evaluate Exposure to Survival Services (ACCESS), a prospective cohort of adult PLWHA who use illicit drugs in Vancouver, Canada. We used multivariate linear regression to identify factors independently associated with higher ART adherence self-efficacy. Among 520 participants, older age and Caucasian ethnicity significantly and independently predicted higher levels of ART adherence efficacy expectations and self-regulatory efficacy, being employed predicted only higher levels of ART adherence efficacy expectations, whereas daily cocaine injection and being homeless significantly and independently predicted lower levels of ART adherence self-regulatory efficacy. Although this study highlights the potential importance that some demographic and contextual factors play in shaping adherence self-efficacy within the context of HIV and illicit drug use, efforts should be made to address methodological inconsistencies when investigating self-efficacy across different populations, including PLWHA. Future findings in this area introduce the notion of implementing screening measures for those at-risk for low ART adherence self-efficacy, as well as tailoring psychotherapy among PLWHA to increase aspects of adherence self-efficacy.
Lay Summary

The effectiveness of antiretroviral therapy (ART) in treating people living with HIV/AIDS (PLWHA) is well-known in the current research. Although self-efficacy - the psychological concept of one’s belief in their own ability to accomplish a certain task - is a strong determinant of ART adherence, little is known about what predicts this concept. As such, the primary goal of this study was to identify which variables significantly predicted ART adherence self-efficacy among PLWHA who use illicit drugs. Results from this study showed that older age and being Caucasian predicted higher levels of ART adherence self-efficacy, whereas homelessness and daily cocaine injection predicted lower levels of ART adherence self-efficacy. In sum, the current study sheds light on a subject of which relatively little is known, and also provides evidence about some risk factors that counsellors and clinicians should pay close attention to when seeing clients with HIV/AIDS.
Preface

This thesis is based on data derived from the B.C Centre for Substance Use (BCCSU), under the AIDS Care Cohort to evaluate Exposure to Survival Services (ACCESS), an observational prospective cohort of adult PLWHA who use illicit drugs in Vancouver, Canada. All projects and associated methods were approved by the University of British Columbia’s Research Ethics Board [certificate #H05-50233]. None of the text of the thesis was taken directly from previously published or collaborative articles.

ACCESS data collection and management is an agglomeration of work carried out by BCCSU front-line staff, bio-statisticians, and myself.

The statistical methodology for this thesis, described in Chapter 3, is largely the product of consultation with Dr. Bruno Zumbo.

The outcome variable of ART adherence self-efficacy, as measured by the Adherence Self-Efficacy Measure (ASEM) is designed by Dr. Thomas Kerr and Dr. John Walsh.

I was responsible for the majority of concept formation, and manuscript composition. Dr. Anita Hubley, primary supervisor, contributed heavily to manuscript revisions, edits, and data set revisions. Huiru Dong was responsible for initial retrieval and creation of the data set, derived from the ACCESS cohort. Dr. Thomas Kerr provided preliminary concept formation, and manuscript revisions and edits as well.
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Acknowledgements

This thesis would not have been possible without the support and contributions from the staff at the BC Centre for Substance Use (especially the front-line staff), members of my thesis committee, and my friends and family.

I owe my sincerest and utmost gratitude to my supervisor Dr. Anita Hubley, who took me on as a last-minute thesis student, and who exceeded my expectations by going above and beyond what was necessary to ensure that this project was crafted as accurately as possible.

I thank Dr. Thomas Kerr for starting my journey of working in the DTES a half-decade ago, and for being an admirable research mentor from the beginning.

Special thanks are owed to Fiona Chiu, who played a crucial role in ensuring that my literature review was as thorough as possible, and Huiru Dong, who guided me through every step of the data retrieval process and interpretation.

Last but not least, I am grateful for the unconditional love and patience from my partner Suzanne, and for the moral support my parents, Lina and James, and my brother Chris, have provided.
Chapter 1: Introduction

HIV epidemic

The HIV epidemic continues to be a global challenge, with an estimated 34 million people living with HIV/AIDS (PLWHA) worldwide (UNAIDS, 2016). In 2012, it was estimated that around 71,000 Canadians were living with HIV, an 11.4% increase from 2008 (Public Health Agency of Canada, 2015). As such, despite recent advances in public health strategies and medical interventions, including the advent of highly active antiretroviral therapy (ART) (Wood et al., 2003), there remains a large proportion of people who continue to become infected, and consequently increase the risk of disease transmission and morbidity. Barriers that could hinder the management of HIV, including structural and demographic barriers, have been well documented (Marshall, Kerr, Shoveller, Montaner, & Wood, 2009; Milloy, Montaner, & Wood, 2012).

ART adherence

One factor in particular that can hinder the effectiveness of HIV treatment is that of ART adherence. Due to the aggressive nature of HIV disease, realizing the full medical benefits of ART requires a high degree of medication adherence. Plasma HIV-1 RNA viral load, which is a key determinant in transmission, is the primary target of ART, wherein the treatment’s goal is to suppress viral load to the point of undetectability and, consequently, halting disease progression and premature death (Hogg, et al., 1998). Despite the benefits of ART on survival and quality of life, and its free availability in the province of British Columbia, Canada, a large body of research has shown that PLWHA who use illicit drugs often exhibit lower levels of adherence in comparison to those from other groups of PLWHA (Bruce, & Altice, 2007; Wood, Montaner,
Tyndall, Schechter, O’Shaughnessy, & Hogg, 2003). Furthermore, this lack of ART adherence has been associated with an array of risky behaviours, including active illicit drug use and environmental exposures, such as homelessness (Krusi, Wood, Montaner, & Kerr, 2010; Milloy, et al., 2012). Consequently, there is an urgent need for clinicians and public health researchers to identify factors that could impact ART adherence among PLWHA who use illicit drugs.

**Self-efficacy**

Current societal efforts to manage HIV have largely focused on information-giving as a key public health strategy, rather than addressing psychosocial factors that shape disease outcomes. However, extensive literature in the medical and psychological fields has described the positive effects that self-efficacy – one’s belief in their own ability to complete successfully a certain task – can have on an array of health outcomes, including medication adherence and mental health outcomes (Bandura, 1997; Colbert, Sereika, & Erlen, 2013; Kerr, et al., 2004; Johnson et al., 2006; Trovato et al., 2012). Moreover, this psychosocial construct, conceptualized in Albert Bandura’s social learning theory (Bandura, 1977), has also been positively associated with ART adherence (Kerr, et al., 2004). The observed relationships between self-efficacy and medication adherence supports the notion that adopting health-promoting practices, such as adhering to one’s rigorous ART regimen, is influenced by one’s belief that they can exert control over their own motivation, thought processes, emotional states, and patterns of behaviour. When a person lacks this sense of self-efficacy, or lacks the ability to self-motivate and self-guide, they are ineffective at managing obstacles, and may experience psychological stress to the point where self-doubt will override any amount of knowledge and skill that they possess (Bandura, 1997). As such, promoting self-efficacy among PLWHA, in conjunction with providing relevant
health education and community resources, can be a productive solution to their observed insufficient ART adherence rates.

**Problem statement**

Although the role that self-efficacy plays in predicting the health outcomes of patients has been well-described in the literature, few studies have been undertaken to identify the predictors of self-efficacy, especially among PLWHA who use illicit drugs. Extant research has suggested that demographic variables, such as age and gender, can predict self-efficacy (Lee, Salman, & Cooksey-James, 2016; Lee, Salman, & Fitzpatrick, 2009; Villegas et al., 2013); however, the research investigating psychological and structural predictors (e.g., homelessness, incarceration) remains unclear. Investigating the predictors of adherence self-efficacy among PLWHA would not only fill an important knowledge gap in the adherence and self-efficacy literature, but is also a necessary step in any psychological, medical, or public health prevention and treatment framework.
Chapter 2: Review of the Literature

Treatment as prevention

Recent advances in the understanding of HIV transmission dynamics have led to the concept of Treatment as Prevention, which has been acknowledged as a crucial strategy in mitigating the deleterious effects of HIV (Coates, Richter, & Cacares, 2008; Dieffenbach, & Fauci, 2009; Kalichman, 2013). This disease elimination strategy is based on the idea of providing full access to immediate ART - the current gold-standard for HIV treatment - through several steps (B.C Centre for Excellence in HIV/AIDS, 2013). The first step is ensuring that more people have access to being tested for HIV, which in turn ensures that more people can access effective treatment. Next, ART is administered to PLWHA, and once treatment is sustained, PLWHA can achieve an undetectable viral load within a relatively short period of time, which allows for PLWHA to lead a long and healthy life, comparable to someone without HIV. Finally, suppressed viral load greatly reduces the risk of HIV transmission to others, and as such, by increasing access to HIV testing and treatment, the prevalence for this disease can be drastically reduced. Currently, implementation of the Treatment as Prevention model for HIV/AIDS in British Columbia has resulted in an 83% drop in AIDS-related deaths, 65% reduction in new HIV cases, and 88% reduction in new AIDS cases since 1994 (B.C Centre for Excellence in HIV/AIDS, 2013). The present task and challenge is to integrate multiple approaches, including behavioural and environmental interventions into the broader HIV treatment framework because, historically, the foci of research and HIV prevention has been in the medical field. Arguably, the success of treatment as prevention will hinge on the ability to bring together the optimal combination of multidisciplinary interventions across different systemic levels (e.g., individual, community, and societal levels). Furthermore, the HIV/AIDS
treatment as prevention movement provides an impetus for the consideration and incorporation of psychological (in particular psychosocial) concepts into the framework.

**ART adherence**

**Importance of ART adherence.** There is substantial evidence that illustrates the effectiveness of HIV prevention interventions and strategies that target high-risk behaviours. For instance, condom use campaigns launched by the Thai government, as well as pregnancy educational services implemented in Uganda, have seen significant declines in HIV prevalence – from 30% to as low as 7% (Hanenberg, Sokal, Rojanapithayakorn, & Kunasol, 1994; Stoneburner, & Low-Beer, 2004). Most importantly, adherence to HIV medication is a quintessential behavioural determinant of treatment success or failure. In a retrospective study of PLWHA who began their ART regimen, researchers found that optimally elevated CD4 cell count – a strong prognostic biological indicator of HIV disease progression – response is associated with ART adherence, which subsequently resulted in continued HIV plasma viral load suppression (Wood, et al., 2000). For treatment to be fully effective, a high degree of adherence (>95%) to the oft-complex ART regimen is required to obtain optimal viral suppression (Deeks, 2003; Paterson et al., 2000). Even intermittent or partial adherence to ART could cause harm, where rapid viral replication can develop into viral resistance (Murphy, Marelich, Hoffman, & Streers, 2004). This suboptimal adherence is one of the primary reasons for failure of ART because, once resistant, the viral strain can no longer be suppressed by that specific drug. Although behavioural interventions present only one piece of the treatment as prevention framework, if compromised (e.g., inadequately adherent), they could jeopardize the effectiveness of other types of interventions and propagate disease transmission and death. As such, clinicians
should pay attention to factors and characteristics that could hinder both schedule and dose adherence when treating PLWHA.

**Illicit drug use and ART adherence.** Substance abuse and HIV have been consistently linked since the beginning of the epidemic, with substance abuse having a substantial impact on the spread of the disease and its treatment (Centers for Disease Control and Prevention, 2017). More specifically, despite the survival benefits of ART and its free availability among countries with universal access to healthcare systems (e.g., Canada), a wide body of research has shown that people who use illicit drugs and have excessive alcohol consumption not only have a higher prevalence of HIV than non-drug using populations, but also exhibit lower levels of adherence compared to other PLWHA (Murphy, Marelich, Hoffman, & Steers, 2004; Palepu, Horton, Tibbetts, Meli, & Samet, 2004; Wood et al., 2003). Increased HIV prevalence among PLWHA who use illicit drugs can be attributed to the mechanisms for infection and disease spread; that is, it is driven largely by injection drug use where syringe sharing and assisted injection have been associated with not only HIV, but also Hepatitis C and abscesses (Tyndall et al., 2003; Vlahov et al., 1997). However, HIV risk is not exclusive to syringe use, as research has found evidence that non-injection drug use, such as use of prescription opiates and benzodiazepines, is independently associated with HIV status and disease spread (Ickowicz et al., 2015, Murphy et al., 2004). The psychoactive effects of the drugs can range from sedation and hallucinations to impaired recall and judgement, which can hinder one’s ability to properly comply with optimal ART adherence (Lucas, 2011). The present literature demonstrates that the risk for HIV infection and transmission internationally among PLWHA who use illicit drugs remains high, and highlights the importance of developing treatment and prevention programs that target adherence intervention and education among this specific population.
Self-efficacy

Social cognitive theory. One factor that has been shown to encourage medication compliance including ART adherence, even in the face of adversity, stems from the psychosocial concept of self-efficacy; one’s belief in their own ability to complete successfully a certain task. According to Bandura’s Social Cognitive Theory (Bandura, 1977; Bandura, 2001), human functioning is the product of a triadic relationship between: 1) personal factors (cognition, affect, and biology), 2) behaviour, and 3) environmental factors. Change in health practices, such as engaging in HIV-related risk behaviours, is thus dependent on the interaction among these three determinants. In turn, the nature of this interaction is reliant on four subcomponents; 1) knowledge of self and health risks, 2) self-regulation, 3) social support, and 4) self-efficacy. In other words, this model highlights that, despite having high levels of knowledge and a strong social network, people can still continue to engage in risky habits if they do not possess high levels of self-efficacy. As such, to encourage health-promoting action-taking, self-efficacy should be enhanced in conjunction with knowledge and social support. In sum, by understanding the role of self-efficacy in the overall psychosocial structure that predicts human functioning, clinicians can inform the treatment as prevention model, while appropriately structuring therapeutic interventions to help PLWHA exercise more control over their health, while indirectly preventing the spread of HIV.

Domain-specific and general self-efficacy. Self-efficacy can be conceptualized as being either domain-specific – one’s sense of self-efficacy across specific yet distinct domains (Bandura, 1997) – or general self-efficacy – one’s global confidence and self-belief to deal with a variety of different scenarios (Sherer, & Maddux, 1982; Scholz, Dona, Sud, & Schwarzer, 2002). Although generalized self-efficacy can help explain a broader range of behaviours when
the context is less specific (e.g., life adjustment after immigration versus solving math problems), Bandura (1997) posits that, for the majority of cases, self-efficacy should be regarded as a task-specific construct as the wording of self-efficacy items will usually involve assessing one’s confidence and efficaciousness surrounding one particular task. Given my interest in investigating PLWHA’s self-efficacy for ART adherence, I looked specifically at ART adherence self-efficacy, rather than PLWHA’s general self-efficacy. For the purpose of simplicity, the use of the term self-efficacy in this thesis will refer to domain-specific self-efficacy, unless stated otherwise.

**Outcomes of self-efficacy.** The literature has documented the key role that self-efficacy plays in the health outcomes of PLWHA. Enhanced self-efficacy has been identified as a critical factor in influencing and reducing HIV-related risk behaviours, such as risky sexual practices and unsafe drug-use behaviours (Bandura, 1994; Kok, deVries, Mudd, & Strecker, 1991; Lee, Salman, & Cooksey-James, 2016). Negotiating condom use or clean needle use, requires not only a belief in one’s own ability to exercise control over their situation, but also in managing their social relationships. Thus, within the social cognitive theoretical framework, it can be said that risk-reduction capabilities are the result of self-regulatory skills that guide and motivate one’s actions, as well as one’s belief in their ability to engage in self-protective activities and networks. In addition to positive health outcomes, the importance of self-efficacy, more specifically adherence self-efficacy, in medication compliance and other treatment regimens has been widely illustrated. For example, higher adherence rates to obesity management, diabetes treatment, smoking cessation, and ART adherence were found to be positively associated with higher levels of adherence self-efficacy (Kerr et al., 2004; Lau-Walker, 2006; Schwarzer, & Fuchs, 1995; Trovato et al., 2012). It is important to note that adherence within the context of
HIV treatment implicates a broader range of behaviours that go beyond the already complex medication compliance, such as regular healthcare provider visits, and routine blood tests. Given the demanding treatment parameters of HIV, the research lends strong support for the incorporation of social cognitive constructs, such as adherence self-efficacy, into the treatment framework with the aim of changing and sustaining desirable health behaviours among PLWHA who use illicit drugs.

**Predictors of self-efficacy.** It is important to note that the majority of the literature has explored the beneficial outcomes of self-efficacy, rather than detailing the predictors of this construct. As such, this current study is drawing from the broader literature on the predictors of self-efficacy to inform our investigation of adherence self-efficacy specifically. Among the few dozen existing studies that sought to investigate this relationship, many have found several demographic factors that predict levels of self-efficacy.

**Gender.** Gender, especially in the condom-use self-efficacy literature, has been an important variable. For example, among a group of American college students, gender differences have been found to predict self-efficacy differently, where those who identify as being male tend to have higher levels of condom-use self-efficacy than their female counterparts (Farmer & Meston, 2006; Quatrella, 2000). By contrast, there are previous findings that report women possessing greater condom-use self-efficacy than men (Dekin, 1996; Fisher, 1996). However, these differences could be attributed, in part, to differing aspects of condom-use self-efficacy that were measured, including (but not exclusively) perceived condom-use barriers, confidence in refusing sexual intercourse, and requesting condom use during sexual encounters. These findings may reflect the societal expectations of masculinity and femininity relating to sexually-related activities, for example, whereas men may be perceived as the initiators of
sexually-related activities (such as condom-use), women may be stigmatized and perceived as sexually permissive if they were to carry condoms. The current literature on gender as a predictor for domains of self-efficacy outside of condom-use and sexual competency are lacking, thus there is a need for further exploration and investigation in other areas of self-efficacy.

**Age.** Age as a demographic variable has also been found to predict self-efficacy, where older age predicted higher perceptions of verbal fluency self-efficacy compared to their younger counterparts (Bajaj, Deepa, Bhat, D’souza, & Sheth, 2016). This particular relationship remained significant despite the fact that the older age group actually had sub-optimal verbal task performance than the younger group. Similarly, Asian-Pacific Islander American women had higher levels of HIV-prevention self-efficacy than youth (<25 years old) (Takahashi, Magalong, DeBell, & Fasudhani, 2006). On the other hand, other researchers have found higher levels of self-efficacy for HIV prevention in younger women (Lauby, Semaan, O’Connell, Person, & Vogel, 2001; Villegas et al., 2013). Furthermore, among patients who suffer from knee osteroarthritis, poorer self-efficacy ratings for exercise and rehabilitation were reported from older patients, perhaps due, in part, to diminished expectations in their capability to perform physical tasks as they age (Maly, Costigan, & Olney, 2006). These results highlight the interplay between experience that comes with age, the challenges that develop as a result of aging, and the nature of the task under which self-efficacy is being scrutinized. It would appear that tasks that are more physically demanding would negatively impact self-efficacy, whereas other tasks that appear to favour age and experience can work to bolster aspects of self-efficacy.

**Race.** As depicted in the research, racial differences laden in cultural values and societal norms can be expected to affect self-efficacy differently. For example, Glatz and Buchanan (2015) have shown that African American parents have higher levels of parental self-efficacy
than European American parents, and suggested that this was the result of the African American
culture placing greater emphasis on parental authority and respect for elders. Although these
findings have also been replicated elsewhere (Pinderhughes, Hurley, & the Conduct Problems
Prevention Research Group, 2008), other studies comparing similar racial groups have reported
no significant racial differences in self-efficacy (Ardelt, & Eccles, 2001; Elder, Eccles, & Ardelt,
1995). Other evidence supporting racial differences can be found in other areas of the self-
efficacy literature; being Hispanic is related to lower condom use self-efficacy, compared to that
found with Caucasian and Asian participants (Farmer, & Meston, 2006), and researchers found
that Caucasian persons with spinal cord injuries predicted higher levels of rehabilitation self-
efficacy than non-Caucasian persons with the same injuries (Horn, Yoels, Wallace, Macrina, &
Wrigley, 1998). Cultural expectations and differences aside, it is also possible that different
racial groups experience societal challenges (i.e., racial stigmatization) more than others, namely
racial minority groups, which can affect one’s ability to develop self-efficacy. Taken as a whole,
there is a rationale for the continued investigation into the role of race in various areas of self-
efficacy.

**Employment and education.** The areas of employment and education as predictors of
self-efficacy have yielded encouraging findings. Horn and colleagues (1998) have observed that,
among their sample of patients with spinal cord injuries, those who have had more than a high
school education exhibited higher levels of rehabilitation self-efficacy than those who did not
have their high school degrees. Although interesting, the study did not further elucidate this
result, and this particular finding was simply a bivariate association. Similarly, Lauby and
colleagues (2001) found that both higher education and employment were positively and
independently associated with higher condom-use self-efficacy, and Dennis (2006) found that
maternal education level was predictive of breastfeeding self-efficacy. Most compellingly, McKellar and colleagues (2008) conducted a longitudinal analysis that looked at predictors of changes in alcohol-related self-efficacy over a 16-year time period and found that higher education was positively predictive of self-efficacy. It is posited that, across these findings, people who are better educated may have enhanced cognitive abilities that allow them to better consolidate achievements, and to continually build on those strengths, which subsequently increases self-confidence. Researchers investigating self-efficacy among patients suffering from chronic musculoskeletal pain found an association between occupational status and self-efficacy; specifically, those who were house-wives or unemployed, had lower pain management self-efficacy than those who are currently employed (Rahman, Ambler, Underwood, & Shipley, 2004). Still, Villegas et al. (2013) failed to find any association between employment status and HIV-prevention self-efficacy. Although the literature generally points to a significant association between self-efficacy and both employment and education, further studies in this area are still needed, as our understanding of this relationship is still in its relative infancy.

**Psychological factors and mental health.** There is a plethora of evidence detailing the positive impact that self-efficacy has on mental health such as depression and anxiety (Ahmad, Yasien, & Ahmad, 2014; Ugalde, Krishnasamy, & Schofield, 2014); however, few research questions have specifically asked about the reverse relationship. Although scarce, some studies examining patients afflicted with physical ailments, such as knee osteoarthritis, musculoskeletal pain, and spinal cord injury, were able to demonstrate that depression predicted lowered levels of self-efficacy (Horn et al., 1998; Maly et al., 2006; Rahman et al., 2003). Similarly, depression was the only significant predictor of self-efficacy among women on long-term sick leave (Andersen, Larsson, Lytsy, Kristiansson, & Anderzen, 2015), and maternal depression among
first-time mothers strongly predicted paternal self-efficacy (Azmoude, Jafarnejade, & Mazlom, 2015). Counterintuitively, this area of research has been equivocal, as many researchers have also failed to find any associations between depression and self-efficacy. For instance, Dennis (2006) showed that maternal anxiety, but not depression, was negatively associated with self-efficacy, and Chang et al. (2014) did not show any association between either anxiety or depression and breastfeeding self-efficacy. Among cancer patients, depression was not predictive of self-efficacy for physical activity (Perkins, Baum, Taylor, & Basen-Engquist, 2009). Similarly, depression was not predictive of condom-use self-efficacy among women who are at-risk for HIV/AIDS (Goldstein, 1996). Greenfield, Venner, Kelly, Slaymaker, and Bryan (2012) also acquired non-significant findings on this topic and posited that these mixed associations between depression and self-efficacy suggests that depression may selectively impact different domains of self-efficacy, rather than a generalized form of self-efficacy.

In sum, it would appear that the literature generally portrays psychological factors or mental health concerns as being disruptive to one’s perception of self-confidence in carrying out certain tasks, and thus reducing levels of self-efficacy. Given the prominence of negative psychological sequelae among PLWHA who use illicit drugs, as well as the mixed findings surrounding psychological disorders in predicting self-efficacy, further investigation in this area is necessary.

**Personal and contextual factors.** Antecedents of self-efficacy in the form of personal factors and contextual factors have also been explored. For example, one’s incarceration history was generally found to not significantly predict changes in levels of self-efficacy. Specifically, incarceration did not affect levels of drug abstinence self-efficacy among a sample of ex-offenders, despite the fact that incarceration was predictive of HIV-risk behaviours within the
same study (Majer, Glantsman, Palmer, & Jason, 2015). Similarly, years of incarceration was not significantly related to self-efficacy among older-age male prisoners (Loeb, Steffenmeier, & Kassab, 2010).

By contrast, having attended 12-Step programs and accessed other drug and alcohol treatment settings in general, have been shown to significantly increase levels of abstinence self-efficacy (Bogenshutz, Tonigan, & Miller, 2006; Majer et al., 2015; Moos, & Moos, 2007). It follows then that substance use itself was found to be a significant negative predictor of abstinence self-efficacy (Majer et al., 2015; Ilgen, McKellar, & Moos, 2007). The same researchers posit that skills and social support acquired during meeting and treatment attendance encourage the fostering of self-efficacy, and that the advent of psychological impairments brought on by drug abuse works against enhancing levels of self-efficacy.

Some attention has also been given to social relationships as a determinant of self-efficacy. Living with a partner or being married was found to be positively associated with self-efficacy among spinal cord injury patients (Horne et al., 1998), but a negative association was found among a sample of Hispanic women at-risk for HIV (Villegas et al., 2013). Intimate partner violence has also been shown to negatively predict condom negotiation self-efficacy (Swan, & O’Connell, 2012). These differences may be attributed to the potential role that relationship dynamics play in influencing self-efficacy, whereby certain populations or situations may be more prone to espouse, for example, more or less spousal emotional support.

Although currently unexplored, it is important to consider the impact of homelessness on self-efficacy, especially given that there is a disproportionate numbers of PLWHA who use illicit drugs that are homeless compared to the general population (Denning, & DiNenno, 2010). Furthermore, homelessness has been identified as a risk factor for poor physical and mental
health (Riley et al., 2012; Thakrar, Morgan, Gaeta, Hohl, & Drainoni, 2016). The dire circumstances (e.g., social isolation, lack of privacy, physical endangerment) experienced by those who are homeless are numerous, and conditions such as these are partly responsible for observed suboptimal ART adherence (Palepu, Milloy, Kerr, Zhang, & Wood, 2011). For this reason, it is assumed that people who are homeless, especially PLWHA who use illicit drugs, would find it challenging to foster self-confidence and self-belief in the face of these obstacles, thus compromising their sense of self-efficacy.

**Predictors of adherence self-efficacy**

As previously mentioned, the literature on medication adherence self-efficacy has focused solely on the outcomes of this psychosocial construct. To date, and to the best of my knowledge, there are no existing studies that have investigated the determinants of adherence self-efficacy, let alone ART adherence self-efficacy, among this specific population of PLWHA who use illicit drugs.

**Rationale for current research**

In light of the ongoing challenges faced by PLWHA who use illicit drugs, and the persistent HIV epidemic, there is concern among clinicians and public health researchers that, despite the free availability of ART for Canadians living in the province of British Columbia, there may be several factors that are rendering this specific population susceptible to further HIV infection and subsequent propagation of disease transmission. There is evidence to suggest that adherence self-efficacy plays an important role in predicting ART adherence among PLWHA who use illicit drugs. No studies, to my knowledge, however, have been undertaken to identify the predictors of ART adherence self-efficacy. Past disparate findings on the predictors of self-efficacy have been affected by methodological issues, including widely different samples, the
number of different domain-specific self-efficacy measures, inconsistent use of predictor variables, and various statistical analyses used. Given these discordant results, it is difficult to know when, how, and what type of psychosocial intervention to implement among different populations. As such, there is a need to not only further the current understanding of specific aspects of self-efficacy, but to also pioneer preliminary research that seeks to explore ART adherence self-efficacy in particular. The present study has incorporated related past work in the area of self-efficacy to determine how the aforementioned factors (demographic, psychological, personal, and contextual) fit into our current framework. Accordingly, investigating the determinants of adherence self-efficacy among PLWHA who use illicit drugs in a Canadian setting would fill an important knowledge gap, and the resulting findings may bear clinical implications that can significantly curb the HIV epidemic.

**Study aims and research questions**

The aim of my thesis, from a social cognitive theoretical perspective, is to identify whether certain demographic, psychological, personal, and contextual factors predict ART adherence self-efficacy among Canadian PLWHA who use illicit drugs. Specifically, my proposed thesis poses the following research questions: Within the cohort of interest: 1) Do demographic variables, including age, gender, ethnicity, employment status, and level of education, predict ART adherence self-efficacy?; 2) Are psychological factors, such as depression, antecedents of adherence self-efficacy?; 3) Are personal factors, including drug use history and relationship status, predictive of adherence self-efficacy?; 4) Can contextual factors, including homelessness, incarceration history, and addiction treatment access, predict adherence self-efficacy?; and 5) Overall, which individual independent variables significantly predict adherence self-efficacy, in the presence of the other predictor variables?
Hypotheses

Among PLWHA who use illicit drugs, and given the current review of the literature:

1) Demographic variables, including older age, identifying as male, higher education, and Caucasian ethnicity, will positively predict ART adherence self-efficacy.

2) The psychological construct of depression will negatively predict ART adherence self-efficacy.

3) Personal factors, such as drug abuse history and being single, will negatively predict ART adherence self-efficacy.

4) Contextual exposures, including homelessness and incarceration history, will negatively predict ART adherence self-efficacy, whereas having accessed addictions treatment programs will positively predict ART adherence self-efficacy.

It is unclear which of these potential predictors will significantly predict adherence self-efficacy in the presence of the other predictor variables and thus no specific hypothesis is generated.
Chapter 3: Manuscript

Introduction

The HIV pandemic continues to be a global challenge, with an estimated 34 million people living with HIV/AIDS (PLWHA) (UNAIDS, 2016). However, the advent of antiretroviral therapy (ART) has significantly impacted the course of the disease (Hammer, 1996) as it has been shown to reliably suppress levels of plasma HIV RNA to the point of undetectability (Egger et al., 2002; Hogg et al., 2001), thus reducing premature HIV-related deaths and the likelihood of onward transmission (Cohen et al., 2016). To be fully effective, and for long-lasting clinical success, an optimal level of adherence is necessary (Palepu et al., 2006; Wood et al., 2004). Failure to achieve adequate adherence to ART can result in viral load rebound, generation of resistance, and increased risk for HIV disease progression and transmission to others (Deeks, 2003; Montaner, 2013; Paterson et al., 2000). Offering immediate access, distribution and maintenance of ART is the mandate of the disease eliminating strategy known as Treatment as Prevention; a strategy that has resulted in an 83% drop in AIDS-related deaths, 65% reduction in new HIV cases, and an 88% reduction in new AIDS cases since 1994 (B.C. Centre for Excellence in HIV/AIDS, 2013).

Despite the survival benefits of ART and its free availability among countries with universal access to healthcare (e.g., Canada), the literature has consistently shown that people who use illicit drugs have a higher prevalence of HIV than non-drug using populations, as well as having lower levels of ART adherence compared to other PLWHA (Murphy, Marelich, Hoffman, & Steers, 2004; Palepu, Horton, Tibbetts, Meli, & Samet, 2004; Wood et al., 2003). The mechanics of drug use are conducive to disease spread, such as the use or reuse of syringes, (Tyndall et al., 2003; Vlahov et al., 1997), while the psychoactive effects of the drugs –
hallucinations, sedation, and cognitive impairments – can hinder one’s ability to properly comply with optimal ART adherence (Lucas, 2011). In conjunction, these issues make it increasingly difficult for PLWHA who use illicit drugs to attain optimal levels of well-being given their already-compromised health. As such, it is critical to pay particular attention to factors that can propagate or mitigate HIV disease progression and transmission among this specific population.

One factor that has been shown to increase levels of ART adherence is the psychosocial construct of self-efficacy, i.e., one’s appraisal and belief in one’s own ability to achieve optimal adherence. The positive health outcomes of self-efficacy have also been well described, including in the context of ART adherence (Colbert, Sereika, & Erlen, 2013; Kerr et al., 2004; Lee, Milloy, Walsh, Nguyen, & Kerr, 2016; Johnson et al., 2006; Trovato et al., 2012). This psychological concept, derived from Bandura’s social cognitive theory (Bandura, 1977, Bandura, 2001), posits that, although heightened awareness and knowledge of health risks are important components for change, effective behavioral change also requires self-confidence and self-motivation. Moreover, a lack of self-efficacy can lead to further discrepancies between knowledge and action-taking. As such, by enhancing perceptions of self-efficacy among PLWHA, these individuals can exercise more control over behaviours relating to HIV disease management, such as schedule and dose adherence, which can lead to better overall health outcomes. Bandura (1997) argues that self-efficacy should be largely regarded as a domain-specific construct, where one’s self-efficacy is specific to individual domains, such as self-efficacy for time management, or PLWHA’s self-efficacy for ART adherence. In this paper, the term self-efficacy will refer to domain-specific self-efficacy, unless stated otherwise.

While the current research has mostly focused on the outcomes of adherence self-efficacy, there is a dearth of literature that has explored the antecedents of this construct.
Although scarce, there is some evidence to suggest the existence of factors that can predict levels of self-efficacy. Demographic variables, including gender, age, ethnicity, employment status and education, have yielded encouraging, yet mixed findings where, for example, older age predicted both higher and lower levels of differing types of self-efficacy, including condom-use and verbal proficiency self-efficacy (Bajaj, Deepa, Bhat, D’souza, & Sheth, 2016; Lauby, Semaan, O’Connell, Person, & Vogel, 2001; Villegas et al., 2013). The research on psychological predictors of self-efficacy, such as depression, suggests a reduction in levels of self-efficacy across different domains with the presence of mental health issues (Briere & Runtz, 1991). However, there is a paucity of research in this area in particular and inconsistent findings are common. Lastly, although several personal and contextual predictors of self-efficacy have been investigated, the results have varied considerably; for example, a predictive relationship was found for treatment attendance and drug-abstinence self-efficacy (Bogenshutz, Tonigan, & Miller, 2006; Moos, & Moos, 2007), but not for incarceration and drug-abstinence self-efficacy (Majer, Glantsman, Palmer, & Jason, 2015; Loeb, Steffenmeier, & Kassab, 2010), and social relationships as a predictor for self-efficacy was inconsistent (Horn et al., 1998; Villegas et al., 2013). Research in this area is limited and important contextual factors, such as homelessness, have not been previously investigated as a predictor for self-efficacy. It is important to note that, although there are studies that have identified a variety of possible predictors of self-efficacy, there has been, to our knowledge, no research that specifically has investigated the predictors of adherence self-efficacy. As such, the current study relied on the existing literature on the antecedents of self-efficacy generally to inform the research on exploring the possible predictors of adherence self-efficacy in particular.
In sum, these equivocal findings highlight the current state of this research, where conclusions have been confounded by methodological issues, inconsistent definitions and use of predictor variables, and varied statistical analyses. Moreover, to date, there are no existing studies that have specifically explored the predictors of medication adherence self-efficacy, let alone ART adherence self-efficacy, among the population of PLWHA who use illicit drugs. Thus, not only is there a need to further our understanding of specific demographic, psychological, personal, and contextual aspects that influence self-efficacy, it is particularly useful to determine variables that are related to ART adherence self-efficacy in particular. Despite the availability of no-cost ART in the province of British Columbia, Canada, the systemic and personal barriers to optimal ART adherence experienced by PLWHA who use illicit drugs are numerous, and findings from this study will fill important knowledge gaps that bear clinical and policy-changing implications that can help address the current HIV epidemic. This study aims to add to the existing literature by exploring whether certain demographic, psychological, personal, and contextual factors predict ART adherence self-efficacy – specifically adherence efficacy expectations (AEE) and adherence self-regulatory efficacy (ASRE) – among PLWHA who use illicit drugs in a Canadian setting.

Methods

Participants and recruitment. The AIDS Care Cohort to evaluate Exposure to Survival Services (ACCESS) is an observational prospective cohort of adult PLWHA who use illicit drugs in Vancouver, Canada. Details of the ACCESS cohort have been described elsewhere (Wood et al., 2008). For this study involving secondary data analysis, the inclusion criteria were that participants: 1) were at least 18 years old at time of intake; 2) had used drugs (other than cannabis) in the previous month of the intake; 3) had an HIV diagnosis; and 4) had ≥ 1 day ART
dispensation prior to date of intake. Participants for ACCESS were recruited through snowball sampling and through community outreach efforts (e.g., posters at essential services for HIV/AIDS groups).

Data for this study were accessed from baseline interviews completed from December 2005 to June 2014. There were 798 ACCESS participants who completed a baseline survey during this time. Among these 798 participants, 579 had $\geq 1$ day ART dispensation prior to date of baseline interview. After removing 59 participants who had missing values for the main outcome variable of ART adherence, 520 participants remained.

**Procedure.** At baseline and semi-annually, participants were administered a standardized questionnaire administered via interview. Completion of the questions, measures, and scales relevant to the research questions took approximately 20 minutes. To compensate participants for their time in the original study, participants received a stipend of $30$ CDN at each interview visit.

**Measures.** The following measures and variables were used in this secondary data analysis to examine potential predictors of ART adherence self-efficacy in this cohort of PLWHA who use illicit drugs.

**ART adherence self-efficacy.** The main dependent variables of self-efficacy were measured by the eight-item Adherence Self-Efficacy Measure (ASEM; Kerr, et al., 2004). This measure used a confidence rating response format that asks individuals to rate their confidence from 0 to 100 in their ability to engage in a range of behaviours specific to adherence to ART. Six items assessed ART adherence self-efficacy (AEE; also known as adherence efficacy expectations) and two items assessed ART adherence self-efficacy explicitly within the context of substance use (ASRE; also known as adherence self-regulatory efficacy). Total scores for
AEE and ASRE were created by averaging ratings across each set of items so that scores on each subscale range from 0 to 100. Higher scores mean higher self-efficacy.

**Depressive symptomatology.** The Center for Epidemiologic Studies Depression (CES-D) scale (Radloff, 1977) is a 20-item self-report measure of depressive symptomatology with an emphasis on the affective component of depressed mood that was developed for use in the general population. The response options for each item indicate frequency of symptoms experienced over the past week: 0 (not at all), 1 (1-2 days), 2 (3-4 days), and 3 (5-7 days). The total score is computed by summing the scores across the items and ranges from 0 to 60. Four items are reverse-scored. Scores above 16 are indicative of severe depressive symptoms and a probable diagnosis of depression (Radloff, 1977).

**Demographic and personal variables.** These variables included: age (in years); gender (male vs. non-male), Caucasian ancestry (yes vs. no); education level (high school completion or higher vs. < high school), employment status (yes vs. no); homelessness (yes vs. no); incarceration (defined as being in detention, prison, or jail for at least one night; yes vs. no); accessing addictions treatment (yes vs. no); and in a relationship (yes vs. no). Drug abuse is captured similarly: daily cocaine injection (yes vs. no); daily heroin injection (yes vs. no); and daily crack cocaine use (yes vs. no). With the exception of age, gender, and Caucasian ancestry, all variables refer to activity in the last 6 months.

**Statistical analysis.** The assumptions of normality and homoscedasticity of the two outcome variables (AEE and ASRE scores) were found to be violated. As a result, robust maximum likelihood (ML) regressions treating predictor variables as covariates (Nelder & Wedderburn, 1972) were conducted and results were compared to the conventional ordinal least squares (OLS) regressions. There were two steps used in the analysis process. Simple linear
regression was used as a first step to evaluate bivariate relationships between the predictor variables and each of the ART adherence self-efficacy variables. Variables that were statistically significant ($p<0.05$) were then entered simultaneously into a multiple linear regression. All statistical analyses were performed using SPSS (version 22.0).

**Results**

**Participant characteristics.** Among this sample of 520 PLWHA who use illicit drugs, 160 (30.8%) identified as non-male, 283 (54.4%) self-reported Caucasian ancestry, 269 (51.7%) did not have a high school education (or equivalent), and the mean age was 43.8 years (SD = 8.10; range = 20-71 years). In the previous six months, 140 (26.9%) were homeless, 61 (11.7%) had been incarcerated, and 271 (52.1%) participants had accessed some form of addiction treatment. The mean number of years that participants had been on ART was 6.6 (SD = 4.53; range: 0-20 years). Full descriptive information for the sample based on the demographic and personal variables is presented in Table 3.1.
### Table 3.1

Descriptive characteristics of people who live with HIV/AIDS and use illicit drugs

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Total (%) (N=520)</th>
<th>Outcome</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Response 1 (%)</td>
<td>Response 2 (%)</td>
<td></td>
</tr>
<tr>
<td>Age (years)</td>
<td>520 (100.0)</td>
<td>43.8</td>
<td>8.10</td>
<td></td>
</tr>
<tr>
<td>Gender (1 = male; 0 = non-male)</td>
<td>520 (100.0)</td>
<td>360 (69.2)</td>
<td>160 (30.8)</td>
<td></td>
</tr>
<tr>
<td>Caucasian ancestry (1 = yes; 0 = no)</td>
<td>520 (100.0)</td>
<td>283 (54.4)</td>
<td>237 (45.6)</td>
<td></td>
</tr>
<tr>
<td>Education (1 = ≥high school; 0 = &lt;high school)</td>
<td>508 (97.7)</td>
<td>239 (46.0)</td>
<td>269 (51.7)</td>
<td></td>
</tr>
<tr>
<td>Employment^b (1 = yes; 0 = no)</td>
<td>520 (100.0)</td>
<td>91 (17.5)</td>
<td>429 (82.5)</td>
<td></td>
</tr>
<tr>
<td>Homelessness^b (1 = yes; 0 = no)</td>
<td>518 (99.6)</td>
<td>140 (26.9)</td>
<td>378 (72.7)</td>
<td></td>
</tr>
<tr>
<td>Relationships^b (1 = yes; 0 = no)</td>
<td>506 (97.3)</td>
<td>147 (28.3)</td>
<td>359 (69.0)</td>
<td></td>
</tr>
<tr>
<td>Incarceration^b (1 = yes; 0 = no)</td>
<td>517 (99.4)</td>
<td>61 (11.7)</td>
<td>456 (87.7)</td>
<td></td>
</tr>
<tr>
<td>Daily heroin injection^b (1 = yes; 0 = no)</td>
<td>520 (100.0)</td>
<td>55 (10.6)</td>
<td>465 (89.4)</td>
<td></td>
</tr>
<tr>
<td>Daily cocaine injection^b (1 = yes; 0 = no)</td>
<td>520 (100.0)</td>
<td>38 (7.3)</td>
<td>482 (92.7)</td>
<td></td>
</tr>
<tr>
<td>Daily crack smoking^b (1 = yes; 0 = no)</td>
<td>520 (100.0)</td>
<td>166 (31.9)</td>
<td>354 (68.1)</td>
<td></td>
</tr>
<tr>
<td>Accessed addiction treatment^b (1 = yes; 0 = no)</td>
<td>514 (98.8)</td>
<td>271 (52.1)</td>
<td>243 (46.7)</td>
<td></td>
</tr>
<tr>
<td>Years on ART^c</td>
<td>520 (100.0)</td>
<td>6.6</td>
<td>4.53</td>
<td></td>
</tr>
</tbody>
</table>

^a As listed in parentheses in the Characteristic column

^b Activity in last 6 months

^c ART = Antiretroviral Therapy
Reliability and typical performance on measures. Cronbach’s alpha was used to estimate reliability for the scores on the two ASEM variables given that the response format used was continuous. Cronbach’s alpha was 0.82 for the AEE and .82 for the ASRE. Ordinal alpha was used to estimate reliability for the CES-D total score given that a four-point Likert-type response format was used. Ordinal alpha for the CES-D scores was .92. AEE and ASRE scores ranged from 10 to 100 (M = 86.4; SD = 17.1), and from 0 to 100 (M = 70.0; SD = 34.4), respectively. Mean CES-D performance ranged from 0 to 57 (M = 23.4; SD = 12.69).

Regression analyses for the AEE.

Simple linear regressions. The results of the simple linear regressions are shown in Table 3.2. Several demographic and psychosocial variables statistically significantly predicted higher AEE (i.e., greater ART adherence efficacy expectations) scores among PLWHA who use illicit drugs, including: older age (B=0.40, p≤0.01), identifying as male (B =5.71, p≤0.01), identifying as Caucasian (B =4.07, p≤0.01), having at least a high school education (or equivalent) (B=3.45, p≤0.05), and having employment (B=4.42, p≤0.05). On the other hand, daily heroin injection (B= -6.45, p≤0.01), daily crack cocaine smoking (B= -5.80, p≤0.01), being homeless (B= -3.43, p≤0.05), and high CES-D score (B= -0.16, p≤0.01) significantly predicted lower AEE scores.

Robust ML linear regression. The results of the robust maximum likelihood (ML) regression are reported in Table 3.2. Variables that significantly predicted higher AEE scores, in the presence of other predictors, included older age (B=0.22, p≤0.05), Caucasian ancestry (B=3.16, p≤0.05), and having employment (B=3.69, p≤0.05).

Multiple OLS linear regression. The results of the ordinary least squares (OLS) multiple linear regression are reported in Table 3.2. This analysis was conducted for comparison purposes as F-tests and $R^2$ values are not available in the robust regression. This model did not exhibit
signs of multicollinearity (variance inflation factors (VIFs) = 1.02–1.14). After controlling for other variables, only older age ($B=0.22, p \leq 0.05$) and identifying as Caucasian ($B=3.16, p \leq 0.05$) remained as statistically significant predictors for higher levels of AEE and explained only a small proportion of variance in the AEE scores ($F(9,461) = 4.31, p \leq 0.01, R^2=0.08, R^2_{\text{adjusted}}=0.06$). Because these results differed somewhat from the robust regression, it is the results from the robust regression that were interpreted.

\footnote{VIF of $\geq 10$ indicates multicollinearity (Hair, Anderson, Tatham, & Black, 1995)}
Table 3.2  
Predicting adherence efficacy expectations (AEE) among PLWHA\textsuperscript{a} who use illicit drugs using simple, robust maximum likelihood, and ordinary least squares multiple linear regression analyses

<table>
<thead>
<tr>
<th>Variables</th>
<th>Unstandardized regression coefficient</th>
<th>[B (p\text{-value})]^*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Simple linear regression</td>
<td>Robust ML multiple linear regression\textsuperscript{b}</td>
</tr>
<tr>
<td>Age (years)</td>
<td>0.40 (&lt;0.001)</td>
<td>0.22 (0.028)</td>
</tr>
<tr>
<td>Gender \textsuperscript{d}</td>
<td>5.71 (&lt;0.001)</td>
<td>2.69 (0.146)</td>
</tr>
<tr>
<td>Caucasian ancestry \textsuperscript{d}</td>
<td>4.07 (0.007)</td>
<td>3.16 (0.043)</td>
</tr>
<tr>
<td>Homeless \textsuperscript{e}</td>
<td>-3.43 (0.042)</td>
<td>-1.54 (0.384)</td>
</tr>
<tr>
<td>Education \textsuperscript{d}</td>
<td>3.45 (0.023)</td>
<td>2.47 (0.098)</td>
</tr>
<tr>
<td>Employment \textsuperscript{d}</td>
<td>4.42 (0.025)</td>
<td>3.69 (0.033)</td>
</tr>
<tr>
<td>Relationships \textsuperscript{d}</td>
<td>-0.26 (0.879)</td>
<td></td>
</tr>
<tr>
<td>Incarceration \textsuperscript{d}</td>
<td>-2.47 (0.280)</td>
<td></td>
</tr>
<tr>
<td>Daily heroin injection \textsuperscript{d}</td>
<td>-6.45 (0.008)</td>
<td>-1.26 (0.654)</td>
</tr>
<tr>
<td>Daily cocaine injection \textsuperscript{d}</td>
<td>-2.81 (0.329)</td>
<td></td>
</tr>
<tr>
<td>Daily crack smoking \textsuperscript{d}</td>
<td>-5.80 (&lt;0.001)</td>
<td>-2.95 (0.097)</td>
</tr>
<tr>
<td>Accessed addiction treatment \textsuperscript{d}</td>
<td>0.57 (0.698)</td>
<td></td>
</tr>
<tr>
<td>CES-D depression score</td>
<td>-0.161 (0.007)</td>
<td>-0.097 (0.103)</td>
</tr>
<tr>
<td>Years on ART \textsuperscript{e}</td>
<td>0.026 (0.876)</td>
<td></td>
</tr>
</tbody>
</table>

\textsuperscript{a} Statistically significant (p < .05) results are bolded  
\textsuperscript{a} PLWHA = people who live with HIV/AIDS  
\textsuperscript{b} Robust maximum likelihood (ML) regression  
\textsuperscript{c} Ordinal least squares (OLS) regression using enter method  
\textsuperscript{d} Activity in last 6 months  
\textsuperscript{e} Antiretroviral therapy
Regression analyses for the ASRE.

Simple linear regression. The results of the simple linear regression are shown in Table 3.3. Several demographic and psychosocial variables significantly predicted higher ASRE (i.e., greater ART adherence self-regulatory efficacy) scores among PLWHA who use illicit drugs, including: older age ($B=0.85, p \leq 0.01$) and identifying as Caucasian ($B=7.67, p \leq 0.05$). Conversely, being homeless ($B=-12.70, p \leq 0.01$), daily heroin injection ($B=-13.47, p \leq 0.01$), daily cocaine injection ($B=-14.77, p \leq 0.05$), and high CES-D score ($B=-0.26, p \leq 0.05$) predicted lower ASRE scores.

Robust ML linear regression. The results of the robust ML multiple regression are presented in Table 3.3. Variables that significantly predicted higher ASRE scores, in the presence of other predictors, included older age ($B=0.55, p \leq 0.01$), and Caucasian ancestry ($B=7.20, p \leq 0.05$), whereas homelessness ($B=-8.70, p \leq 0.05$), and daily cocaine injection ($B=-12.78, p \leq 0.05$) significantly predicted lower ASRE scores.

Multiple OLS linear regression. Results of the OLS multiple linear regression are shown in Table 3.3. This analysis was conducted for comparison purposes as $F$-tests and $R^2$ values are not available in the robust regression. This model did not exhibit signs of multicollinearity (VIFs = 1.03–1.10). After controlling for other variables, older age ($B=0.54, p \leq 0.01$), and Caucasian ancestry ($B=7.20, p \leq 0.05$) remained statistically significant predictors for higher levels of ASRE, while homelessness ($B=-8.70, p \leq 0.05$), and daily cocaine injection ($B=-12.78, p \leq 0.05$) remained significant predictors for lower levels of ASRE. Because these results are consistent with the robust ML regression, it is helpful to report that this model explained only a small proportion of variance in the ASRE scores ($F(6,473) = 6.04, p \leq 0.01, R^2=0.07, R^2_{adjusted}=0.06$).
Table 3.3
Predicting adherence efficacy expectations (ASRE) among PLWHA\(^a\) who use illicit drugs using simple, robust maximum likelihood, and ordinary least squares multiple linear regression analyses

<table>
<thead>
<tr>
<th>Variables</th>
<th>Unstandardized regression coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Simple linear regression</td>
</tr>
<tr>
<td>Age (years)</td>
<td>0.85 (&lt;0.001)</td>
</tr>
<tr>
<td>Gender (1 = male; 0 = non-male)</td>
<td>4.11 (0.209)</td>
</tr>
<tr>
<td>Caucasian ancestry (1 = yes; 0 = no)</td>
<td>7.67 (0.011)</td>
</tr>
<tr>
<td>Homeless(^c) (1 = yes; 0 = no)</td>
<td>-12.70 (&lt;0.001)</td>
</tr>
<tr>
<td>Education (1 = ≥high school; 0 = &lt;high school)</td>
<td>4.49 (0.143)</td>
</tr>
<tr>
<td>Employment(^d) (1 = yes; 0 = no)</td>
<td>0.61 (0.988)</td>
</tr>
<tr>
<td>Relationships(^d) (1 = yes; 0 = no)</td>
<td>-6.18 (0.068)</td>
</tr>
<tr>
<td>Incarceration(^d) (1 = yes; 0 = no)</td>
<td>-3.59 (0.442)</td>
</tr>
<tr>
<td>Daily heroin injection(^d) (1 = yes; 0 = no)</td>
<td>-13.47 (0.006)</td>
</tr>
<tr>
<td>Daily cocaine injection(^d) (1 = yes; 0 = no)</td>
<td>-14.77 (0.011)</td>
</tr>
<tr>
<td>Daily crack smoking(^d) (1 = yes; 0 = no)</td>
<td>-3.62 (0.264)</td>
</tr>
<tr>
<td>Accessed addiction treatment(^d) (1 = yes; 0 = no)</td>
<td>0.32 (0.916)</td>
</tr>
<tr>
<td>CES-D depression score</td>
<td>-0.26 (0.036)</td>
</tr>
<tr>
<td>Years on ART(^e)</td>
<td>0.04 (0.902)</td>
</tr>
</tbody>
</table>

\(^*\) Statistically significant (p < .05) results are bolded
\(^a\) PLWHA = people who live with HIV/AIDS
\(^b\) Robust maximum likelihood (ML) regression
\(^c\) Ordinal least squares (OLS) regression using enter method
\(^d\) Activity in last 6 months
\(^e\) Antiretroviral therapy
Discussion

The purpose of the study was to explore the predictors of ART adherence self-efficacy among PLWHA who use illicit drugs in a Canadian context. This is the first study to do this. I also examined two different measures of ART adherence self-efficacy: (1) adherence efficacy expectations (AEE) – one’s assessments of personal adherence efficacy – and (2) adherence self-regulatory efficacy (ASRE) – one’s faith in one’s ability to adhere to ART in the face of challenges – that examines ART adherence self-efficacy within the context of substance use. Although subtle, regulatory efficacy and efficacy expectations are conceptually different (Bandura, 2001), and this two-pronged approach paints a more detailed picture of the underlying mechanisms that seek to influence aspects of adherence self-efficacy.

I hypothesized that demographic variables (i.e., older age, identifying as male, being Caucasian, higher education), psychological variables (i.e., lower levels of depressive symptoms), and personal/contextual factors (i.e., not using different drugs daily in the last six months, being in a relationship in the last six months, being employed in the last six months, not being homelessness in the last six months, not being incarcerated in the last six months, having accessed addictions treatment programs in the last six months), and more years on ART would be related to higher ART adherence self-efficacy (AEE and ASRE) at the bivariate level. This hypothesis was only partly confirmed. In the case of AEE, I found that older age, identifying as male, identifying as Caucasian, having at least a high school education (or equivalent), having employment, not being homeless, lower CES-D depressive symptomatology, not injecting heroin daily, and not smoking crack cocaine daily significantly predicted higher AEE scores at the bivariate level. Relationship status, incarceration history, daily injecting of cocaine, addictions treatment program access, and years on ART, however, did not show a significant bivariate
relationship with AEE scores. In the case of ASRE, older age, identifying as Caucasian, not being homeless, not injecting heroin or cocaine daily, and lower CES-D depressive symptomatology predicted higher ASRE scores. Gender, educational level, employment status, relationship status, recent history of incarceration, daily crack smoking, addictions treatment, and years on ART did not significantly predict ASRE scores. It is notable that there were similarities but also differences in the bivariate relationships with each of these two measures of ART adherence self-efficacy. These findings reflect the manner in which appraisal of consequences, and appraisal of the ability to overcome challenges in the face of drug use, are conceptually different, and thus may be isolated and addressed in a treatment setting where necessary.

The next step was to examine which measures found to have significant bivariate relationships with AEE and ASRE continued to predict each of these ART adherence self-efficacy scores, in the presence of the other predictor variables. Based on the results of robust ML regressions, three variables significantly predicted higher AEE scores: older age, self-identifying as Caucasian, and being employed. In the case of ASRE, four variables significantly predicted higher ASRE scores: older age, self-identifying as Caucasian, not being homeless, and not injecting cocaine daily in the last six months. Although these findings are consistent with some of the existing literature exploring the determinants of self-efficacy (Bajaj, Deepa, Bhat, D’souza, & Sheth, 2016; Takahashi, Magalong, DeBell, & Fasudhani, 2006), it was surprising that many hypothesized predictors, including education, years on ART, incarceration, and depression were not predictive of adherence self-efficacy in the presence of the other variables in this study.

Age independently predicted both AEE and ASRE, wherein older PLWHA who use illicit drugs exhibited higher levels of ART adherence self-efficacy compared to their younger
counterparts. These results lend support for Bandura’s (1997) posited sources of self-efficacy, in that certain sources, such as mastery experience – appraisal of successful experience in accomplishing a certain task – may be enhanced with age by allowing individuals more opportunity to perform and accomplish tasks successfully, compared to those who are younger. Along these lines, it is important to note, however, that our variable of years on ART did not significantly predict higher levels of adherence self-efficacy. Despite this surprising and counterintuitive finding, several age-associated characteristics and contextual factors may still provide an explanation for the influence of older age on mastery experience and, subsequently, adherence self-efficacy. For example, it could be the case that our sample of older PLWHA have prior experience complying with a multitude of other treatment regimens that are directed at, or associated with, illicit drug use, including methadone dispensation, and Hepatitis-C treatment. Given the potentially higher number of treatment and medication regimens, older PLWHA who use illicit drugs may be afforded the opportunity to acquire a higher sense of collective mastery over tasks involving similar routines that could subsequently have an impact on their sense of ART adherence self-efficacy. Finally, given the high association between ART adherence self-efficacy and actual ART adherence (Kerr et al., 2004; Lee et al., 2015), it is possible that older PLWHA in this cohort (who have higher baseline adherence self-efficacy than younger PLWHA) either improved their adherence self-efficacy over time with age, or they outlived those who had lower adherence self-efficacy when younger, and thus this is the reason for their high ART adherence (i.e., a survivor effect).

Another demographic variable that independently and significantly predicted greater levels of AEE and ASRE is that of Caucasian ancestry. The literature has demonstrated racial differences in other areas of self-efficacy, and suggested that these differences could be
attributable to cultural norms and values espoused by the particular racial group (Buchanan, Grzywacz, & Costa, 2013; Glatz, & Buchanan, 2015; Pinderhughes, Hurley, & the Conduct Problems Prevention Research Group, 2008). In our cohort of Canadian PLWHA, nearly half of the participants identified as non-Caucasian, and approximately one-third of this cohort are of Indigenous ancestry (Ti, et al., 2017). This statistic is important because the manner in which different racial groups experience societal challenges may hinder the appropriate development of self-efficacy, and there is evidence that demonstrates greater societal barriers and stigmas experienced by racial minorities (Awofeso, 2011; Ayden, et al., 2013; Kim, & Keefe, 2010). In turn, psychological processes can be disrupted through racial stigma, where resources for emotional self-regulation to manage a devalued identity (Major, & O’Brien, 2005) are quickly depleted. This can lead to compromised cognitive functioning (Hatzenbuehler, Phelan, & Bruce, 2013), including negative perceptions of self-efficacy. Taken as a whole, this finding brings attention to the importance of racial differences and the potential impact that racial stigma can have on psychological processes, especially from a social cognitive lens.

The current study found that, among illicit drug use, only daily cocaine injection predicted lower levels of ASRE. This is, to our knowledge, the first study to show the effect of specific illicit drug use on self-efficacy. Given that the psychoactive effects of cocaine can severely impair cognitive functioning (Spronk, Wel, Ramaekers, & Verkes, 2013), it is likely that PLWHA who are frequent cocaine users have difficulty retrieving successful experiences of ART adherence, thus feeling less confident with their ART adherence when faced with their drug use. Furthermore, a compromised ability to problem-solve can also hinder PLWHA’s regulatory efficacy beliefs to follow through with the complex schedule and combination of pills needed to optimally adhere to ART. The finding that only ASRE, but not AEE, was predicted by daily
cocaine use shows that the specific effects of cocaine do not hinder one’s entire efficacy expectation to adhere to ART, but rather, hindrance to one’s efficacy arise when one’s drug use is taken into consideration. This suggests that PLWHA who use cocaine may otherwise be generally confident with ART adherence, but their lack of efficacy belief is directly related specifically to their cocaine use. The current finding adds some insight into the mechanics of self-regulatory efficacy, where cognition can play an important role in determining one’s sense of their ability to comply with ART, in the face of drug-related barriers.

In our sample of PLWHA, we found that being employed was independently associated with higher levels of AEE. Research in this area has focused exclusively on the effects of self-efficacy on employment, thus our study has identified a novel finding in the social cognitive theory literature. Attaining and maintaining employment is, in itself, a task that requires efficacy expectations in other domains, and mastery experiences relating to task completion, schedule adherence, and skill competency may inform positive appraisals of AEE. In other words, for instance, successfully following a work schedule and being able to organize work-related activities may promote further confidence in other areas of scheduling and organization, including confidence in remembering when to take HIV medications at the right time, or being able to arrange activities around taking HIV medications. Our finding that employment did not significantly predict ASRE is possibly the result of those who are employed being generally (presently) non-avid drug users, hence being unable to accurately appraise their ability to self-regulate in light of drug use.

Finally, the present study showed that being homeless predicted lower levels of ASRE among PLWHA. To our knowledge, this study is the first to explore homelessness as a predictor for self-efficacy. PLWHA who are homeless undoubtedly live in harsher social and physical
environments, where many basic necessities such as access to clean running water, and having privacy, are difficult to obtain. Due to the fact that many elements of basic living are out of the homeless person’s control, physical survival becomes a priority, thus one’s confidence in overcoming drug-related obstacles when adhering to ART becomes diminished. As such, decreased exposure to successful experiences (i.e., mastery experience) of overcoming difficult tasks (i.e., complying to ART) can translate to lower levels of ASRE. Although AEE was not predicted by homelessness in the multiple regression, the finding that homelessness predicted reduced levels of ASRE demonstrates that perceptions of self-efficacy can change given different contexts (e.g., drug using vs non-drug using situations), and highlights the importance of developing self-efficacy measures that not only appropriately capture the specific domain, but also encapsulates the distinctive contextual characteristics that define a particular population.

While some of our variables independently predicted adherence self-efficacy, many did not in the presence of other variables. Our results for some demographic variables, which included gender, and education, have been discrepant from the literature, in that they predicted other domains of efficacy, including condom-use self-efficacy, parental self-efficacy, and HIV-prevention self-efficacy (Glatz, & Buchanan, 2015; Lauby, Semaan, O’Connell, Person, & Vogel, 2001; Villegas, et al., 2013). Similarly, our psychological variable of depression also did not predict adherence self-efficacy, and historically, the literature in this area has been equivocal. For instance, depression was not found to independently predict condom-use self-efficacy (Chang et al., 2014; Goldstein, 1996; Perkins, Baum, Taylor, & Basen-Engquist, 2009), while some studies found such an association with paternal self-efficacy (Dennis 2006; Maly et al., 2006; Rahman et al., 2003). Lastly few independent associations were identified between our personal and contextual factors, and levels of adherence self-efficacy. The research in this area is
mixed, where, for example, incarceration, and being married did not significantly predict health-promoting self-efficacy, and recovery self-efficacy, respectively (Horne et al., 1998). On the other hand, time spent in addiction treatment and programs, such as 12-step programs, have shown increased levels in abstinence self-efficacy (Bogenshutz, Tonigan, & Miller, 2006; Moos, & Moos, 2007).

A number of reasons could explain the discrepant findings between this study and much of the existing literature. First, there was great variation in the way that self-efficacy was defined and measured (e.g., using words such as “comfortable” instead of “confident”) in the literature, which increases the risk for eliciting different responses for the same construct. Next, the manner in which each variable impacts self-efficacy can vary as a function of the domain under scrutiny. For example, the effect of age and gender on self-efficacy may be more pronounced (or inversely predictive) in a physically-oriented self-efficacy domain, compared to a mentally-focused self-efficacy domain. Moreover, domains of self-efficacy that are more cognitively or affectively-oriented (e.g., parental self-efficacy, time-management self-efficacy) may be more susceptible to change depending on the type of mental health issue (e.g., mood versus personality disorders). Nonetheless, given that this is the first study to investigate the predictors of ART adherence self-efficacy, the findings presented here are an excellent starting point for future research.

**Strengths and limitations.** The key strength of this study is the fact that this research is the first of its kind to explore the antecedents of ART self-efficacy, therefore bridging an important knowledge gap in the literature. The data were collected from the largest known cohort of PLWHA who use illicit drugs (ACCESS), which yielded a relatively large sample size with which adequate statistical power was achieved. Given the strong reliability estimates obtained, I can feel confident about these findings. Still, this research also has its limitations. First, ACCESS
is not a random sample, and thus the results are not fully generalizable. Next, the data were based on self-reports, which are susceptible to response biases. Third, the use of secondary data for this study restricted my ability to include potentially important variables relevant to ART adherence self-efficacy. Relatedly, there is the possibility that the associations that were explored may have been influenced by unmeasured confounders.

**Conclusion.** Research in self-efficacy has primarily focused on the outcomes of self-efficacy across many areas of health and well-being, but little attention has been paid to what predicts self-efficacy. Furthermore, given the unique functioning of self-efficacy within different domains, it is crucial to identify which variables predict what type of self-efficacy. Prior to this study, the antecedents of ART adherence self-efficacy among PLWHA who use illicit drugs have not been investigated. It has been documented that high levels of adherence self-efficacy are associated with optimal levels of ART adherence (Kerr et al., 2004; Lee et al., 2016), and thus it is important to determine what variables precede adherence self-efficacy, as those variables could consequently affect the health outcomes of PLWHA.

The current study identified, using multiple linear regression analyses, older age, and being Caucasian, as significant predictors (in the presence of other predictors) of higher levels of both AEE and ASRE, being employed significantly predicted AEE, while homelessness and daily cocaine injection independently and significantly predicted lower levels of ASRE among PLWHA who use illicit drugs in a Canadian setting. These findings encourage clinicians working with PLWHA to pay special attention to, and screen for, those risk factors associated with ART adherence self-efficacy. Adherence self-efficacy interventions among PLWHA should focus on increasing cognitive self-regulatory behaviors such as goal-setting, monitoring, and planning in the face of illicit drug use when taking ART. Furthermore, adherence self-efficacy
interventions that include the modeling of ART-adherent behaviors through peers may be successful in increasing ART adherence self-efficacy. Similarly, interventions that shape self-efficacy through practice and reinforcement can be successful at decreasing negative perceptions of efficacy expectations.
Chapter 4: Conclusion

The overall purpose of the present study was to identify which demographic, psychological, personal, and contextual factors predict ART adherence self-efficacy among PLWHA who use illicit drugs. To date, there is no research that has attempted to do this. The scarce existing literature on predictors of self-efficacy in a range of domains suggests some possible contenders. For example, demographic variables, including age, gender, ethnicity and employment, have been shown to affect levels of self-efficacy (Bajaj, Deepa, Bhat, D’souza, & Sheth, 2016; Dennis, 2006; Glatz, & Buchanan, 2015; Villegas et al., 2013). Psychological factors, including depression and anxiety, have suggested a reduction in levels of self-efficacy (Maly et al., 2006; Rahman et al., 2003). There are gaps in our current understanding of whether certain contextual factors predict self-efficacy, as factors such as homelessness have never been previously investigated. It should be noted that, given the domain-specific nature of self-efficacy, certain contextual factors may be more germane to that particular population or situation than others (e.g., homelessness among PLWHA who use drugs, spousal support among first-time parents). In sum, the overall research in this area contains contradiction (e.g., older age has been found to predict both higher and lower levels of self-efficacy) (Bajaj et al., 2016; Lauby, Semaan, O’Connell, Person, & Vogel, 2001) and uncertainty (e.g., depression independently predicts paternal self-efficacy, but not injury recovery self-efficacy) (Andersen, Larsson, Lytsy, Kristiansson, & Anderzen, 2015; Horne et al., 1998).

This study found that, in the presence of other variables, older age and being Caucasian predicted both higher levels of AEE and ASRE, having employment was only predictive of AEE, while not being homeless and not injecting cocaine daily only predicted higher levels of ASRE. While no other independent associations were found between our other dependent variables and
adherence self-efficacy, this research has not been previously undertaken; therefore, these findings add more value to our understanding of social cognitive theory within the HIV/AIDS and illicit drug-using context. Furthermore, this study explored adherence self-efficacy by distinguishing its components into self-regulatory efficacy and efficacy expectations. This approach allows a deeper characterization of the differential roles that demographic, psychological, personal, and contextual variables play in predicting adherence self-efficacy.

**Implications for counselling psychology**

This research bears important counselling implications when treating PLWHA who use illicit drugs. For example, cognitive behavioural approaches can help clients identify past successful performances (i.e., mastery experience) relating to regimen adherence that may be blocked by cognitive distortions. A meta-analysis seeking to identify the effectiveness of a broad range of interventions found that providing and facilitating the retrieval of past successful performances had a profound positive effect on perceived physical activity self-efficacy (Ashford, Edmunds, & French, 2010). Highlighting mastery experiences can be particularly helpful in promoting self-regulatory efficacy especially among PLWHA who are, for example, homeless or daily cocaine injectors, where awareness of goal attainment and planning experiences can act as a buffer against perceptions of context-relevant obstacles. Additionally, the same study found that physical activity self-efficacy was significantly higher when vicarious experience - the observance of seeing someone perform the same or similar task - was used as an intervention technique. This finding supports the use of peer counsellors who are optimally ART-compliant to model corrective experiences with PLWHA who are at-risk for low adherence self-efficacy. Furthermore, feedback that highlights, encourages, or rewards positive adherence behavior in PLWHA could also promote adherence self-efficacy.
In addition to integrating CBT interventions to encourage the retrieval and facilitation of mastery experiences and vicarious learning, counsellors should also aim to address any potential underlying racially motivated stigmas and barriers among non-Caucasian PLWHA. Through culturally appropriate approaches, techniques that involve restoring, for example, a stronger sense of social identity and eliminating negative self-attributional racial biases may be necessary as a first step before a counsellor can begin their work on increasing a client’s sense of self-efficacy, as one could act as a blockade for achieving the other. Along the same line, and more broadly, those who believe they can exercise control over their emotional life (adaptive emotional coping) are more successful in positively appraising their self-efficacious efforts than those who succumb to maladaptive emotional states (Bandura, 1997). Counsellors would be wise to incorporate interventions that seek to help clients navigate their emotional experiences and, in turn, enhance perceptions of self-efficacy.

While it is important to acknowledge individual factors that can affect adherence self-efficacy, consideration toward the social and environmental constraints that limit the ability to access HIV care among PLWHA who use illicit drugs should be similarly prioritized. In other words, strong belief in one’s own ability to adhere to ART is essentially meaningless when the same individual cannot initially obtain proper HIV care as a result of inherent barriers. As such, interventions and strategies at the systemic level can help reduce those constraints. For example, especially pertinent to my specific population, informing policy change that seeks to promote low barrier housing that integrates medical support within its framework (e.g., Housing First intervention) can improve access to care tailored specifically for each individual tenant, including HIV treatment. The effectiveness of such systemic interventions have been shown in several studies (Nelson, Aubry, & Lafrance, 2007). Instilling a sense of control over one’s own
environment, and providing a sense of safety, are paramount, and should be addressed at least in conjunction with social psychological factors.

Similarly, acknowledging the underlying factors that can hinder adequate HIV care, from an aboriginal perspective, is a necessary step when informing the overall HIV-treatment framework. For example, it is important to recognize the intergenerational trauma that permeates the aboriginal community in Canada, and recognizing that culturally-appropriate practices such as sweat lodges, and drumming circles, may be more effective than solely traditional western counselling practices. In this manner, promoting aboriginal perspectives of well-being among health practitioners working with aboriginal people can, ideally, restore or enhance a sense of indigenous community. Lastly, encouraging services, clinics, and general settings geared specifically for aboriginal populations can reduce feelings of stigma and prejudice when accessing treatment and care. In sum, counsellors should check their own biases and (lack of) awareness when working with PLWHA who use illicit drugs by simply asking these individuals “what would you find helpful?”. What might be hindering adequate care, such as ART adherence, may be factors that are outside of our awareness.

**Future research directions**

This thesis has recommendations for future research. First, many of our predictors, such as incarceration and employment, were measured dichotomously, but can indeed be time-sensitive in nature. Thus, value would be added to the research if these predictors could be measured by duration, rather than simply by their presence. Although the use of a cross-sectional design was appropriate for this initial exploratory research, future analyses would be enhanced by a longitudinal design, as the effects of the antecedents of ART adherence self-efficacy can be masked by time. Next, a qualitative inquiry into the development of, for example, negative
emotional coping mechanisms and racial stigmas, and how they interact with efficacy beliefs could give us insight into the individual rules that govern self-efficacy evaluations and perceptions. Future research could also consider approaching self-efficacy in light of Bandura’s (1997) four posited sources of self-efficacy: mastery experience, vicarious experience, verbal persuasion, and physiological effect. Studies that have defined antecedents of self-efficacy according to each specific source have identified several significant predictors in a variety of domains of self-efficacy (Britner, & Pajares, 2006; Tschannen-Moran & Woolfolk-Hoy, 2007; Usher & Pajares, 2009; Warner, Schuz, Wolff, Parschau, Wurm, & Schwarzer, 2014). Investigating self-efficacy in this manner can provide some consistencies when attempting to predict self-efficacy across different contexts, among an equally different set of populations.

It should be noted that one of my inclusion criteria for being in the study was to be on ≥1 day of ART dispensation prior to their date of intake. However, for this study, ART was measured in years, which means that someone who has been on ART for 2 days or even 9 months would still be assigned a value of “0” years on ART. As such, future studies should seek to measure time on ART in a more sensitive manner, such as in months, weeks, or days on ART. Relatedly, it would be more informative if the inclusion criteria was set for a longer minimum length of time on ART (e.g., 1 or 3 months) to allow for individuals to better assess their ability and self-efficacy to adhere to ART. Lastly, time spent optimally adhering to ART was not measured in this study, and future research investigating adherence self-efficacy should distinguish between optimal ART adherence, compared to simply time spent on ART.

A final caveat for pursuing research in predicting self-efficacy is that the literature suffers from methodological problems, such as a lack of consistency in how self-efficacy is defined and measured across studies and poor psychometrics for measures of self-efficacy. Greater attention
needs to be paid to examining different sources of validity evidence (e.g., test content, internal structure, response processes) to ensure the inferences made from test scores are meaningful, appropriate, and consistent with intended conceptual and operational definitions of global and specific self-efficacy measures.

Prior to the present study, there has been no existing research looking specifically at predictors of ART adherence self-efficacy. Thus, this study is the first of its kind to fill this knowledge gap and provide some understanding of what variables contribute specifically to variability in ART adherence self-efficacy scores (i.e., AEE) as well as the variability of adherence self-efficacy within the context of drug use (i.e., ASRE). Data for this study were drawn from ACCESS, which to my knowledge is, the largest cohort of PLWHA who use illicit drugs; thus providing a large sample size (N = 520) for a population that has been traditionally hard to recruit in the past due to stigmatization (Smith, Rossetto, & Peterson, 2008). Moreover, the satisfactory reliability estimates for the ART adherence measures, and ample statistical power from an adequate sample size, is a further strength of the study. Additionally, this means that a lack of significant findings are likely not attributable to a lack of statistical power nor are results attenuated due to low reliability of scores.

Our study also has some limitations. First, ACCESS is not a random sample, and therefore the findings are not fully generalizable. Second, some data were collected via self-report and are thus vulnerable to response biases, including recall bias and social desirability. For instance, given the sensitive nature of some interview questions, respondents may be inclined to underreport stigmatizing behaviors such as illicit drug use and other high-risk behaviors. As a result, some of the statistical findings could be impacted by reduced score variability. At the same time, some of the scales may have elicited extreme responding, notably for our
psychosocial measures, as it has been previously shown that participants are more likely to respond in an extreme manner when it pertains to their own beliefs and motivations (Furnham, 1986). Third, the use of secondary data limited the ability to include other variables, and any model is only as good as the variables and measures included in it. We may have neglected potentially important predictors of ART adherence self-efficacy, such as additional mental health factors (e.g., PTSD, anxiety disorders). Lastly, it is also possible that the relationships studied may have been influenced by unmeasured confounders.

It has been well-established that self-efficacy is a critical driver for medication adherence, including ART, and the current study sought to investigate the factors that can predict adherence self-efficacy among the unique and highly stigmatized population of PLWHA who use illicit drugs. Despite the various challenges highlighted by this study, there remains an opportunity to improve the overall health of PLWHA from a social-cognitive lens, thus endeavours should be made to appropriately research, design, evaluate, and incorporate psychosocial practices into the treatment framework for the HIV/AIDS epidemic. From this perspective, and in accordance with the Treatment as Prevention strategy, great responsibility is bestowed upon counselling psychologists, as the first steps toward disease eradication can begin through the enhancement of factors that nurture efficacy beliefs.
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Appendix: Adherence Self-Efficacy Measure

62. The questions below are designed to help us get a better understanding of the kinds of things that are difficult for people when taking HIV medications. Please rate how well you think you can or could do the things described below, even if you have never taken antiretroviral therapy. Please rate your level of confidence by recording in each space a number from 0 to 100 using the scale below.

<table>
<thead>
<tr>
<th>Can’t / couldn’t do it at all</th>
<th>Moderately certain can / could do it</th>
<th>Certain can / could do it</th>
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<tbody>
<tr>
<td></td>
<td>0 10 20 30 40 50 60 70 80 90 100</td>
<td></td>
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</tbody>
</table>

Confidence (0 – 100)

1. Remember to take your HIV medications at the right times.
2. Remember how many HIV pills / medications you have to take.
3. Obtain the food you are supposed to eat with your HIV medications.
4. Manage the side effects that come with taking your HIV medications.
5. Remember to pick up your prescription refills.
6. Arrange your daily activities in order to take your HIV medications as directed.

63. A few situations are described below that can make it hard to take your HIV medications as directed. On the items below, please rate your confidence that you can / could take your HIV medications as directed on a regular basis, even if you have never taken antiretroviral therapy. Please rate your level of confidence by recording in each space a number from 0 to 100 using the scale below.

<table>
<thead>
<tr>
<th>Can’t / couldn’t do it at all</th>
<th>Moderately certain can / could do it</th>
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<tr>
<td></td>
<td>0 10 20 30 40 50 60 70 80 90 100</td>
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</table>

Confidence (0 – 100)

1. When using drugs
2. When you are dope sick