

SDT, MOTIVATION, AND PROCRASTINATION

**Stop Procrastinating on Procrastination: An Exploration of Academic Procrastination
Through the Lens of Self-Determination Theory**

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Abstract

A significant portion of students engage in the problematic behaviour of procrastination. Previous research has suggested that motivation, or a lack thereof, may play an important role in developing and maintaining this behaviour. From a self-determination theory (SDT) perspective, autonomous motivation results from having one's basic psychological needs satisfied. Given this perspective, it is possible that targeting the basic psychological needs could have implications for procrastination. There have been few studies, however, that have examined the interaction between basic psychological need satisfaction, motivation, and procrastination from an SDT perspective. Furthermore, there have been no interventions for procrastination that have targeted these variables. Broadly, the goal of the present research is to examine the relationships between basic psychological needs, academic motivation, and academic procrastination, and to develop and implement an intervention targeting academic procrastination based on SDT as a theoretical framework. Given that previous research has suggested the utility of motivational interviewing (MI) in the context of SDT, this study will use MI techniques to target SDT variables. The first study examined the role of each of the basic psychological needs (BPN) and their relationship with the different types of academic motivation (autonomous, controlled, and amotivation) and academic procrastination through a mediation model where academic motivation mediates the relationship between BPN satisfaction and frustration, and academic procrastination. A sample of undergraduate students ($N= 617$) completed an online questionnaire about their university experience. The data was analyzed using a mediational structural equation model. Results suggested that the different types of academic motivation partially mediated the relationship between BPN satisfaction and procrastination, but not the relationship between BPN frustration and procrastination. The second study used the first study as a theoretical foundation for the

design and implementation of a brief intervention that used SDT as a theoretical framework and MI strategies to target the three BPN as a means of increasing autonomous motivation and decreasing academic procrastination. Two hundred and twenty-three university students were randomized to the intervention or control groups. The participants completed an online questionnaire pre- and post-intervention. Results suggested that our intervention increased BPN; however, it did not significantly increase autonomous motivation or decrease academic procrastination. The findings of the second study demonstrated the effectiveness of MI strategies in targeting BPN. As a whole, the current research contributed to a more nuanced understanding of the relationships between BPN satisfaction and frustration, the different types of academic motivation, and academic procrastination. It also highlights the effectiveness of MI strategies in targeting BPN variables, as well as future theoretical and methodological considerations when designing future procrastination interventions.

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Dedication

This thesis is dedicated to the students we have lost and those currently struggling with their
mental health.

We need to do better.

Contribution of Authors

The dissertation outlined in this document consists of two manuscripts:

Study 1: Oram, R., & Rogers, M. (Submitted). Academic Procrastination in Undergraduate Students: Understanding the Role of Basic Psychological Need Satisfaction and Frustration and Academic Motivation. *Journal of Further and Higher Education*.

Study 2: Oram, R., Rogers, M., & Dou, T. (Submitted). Stop Procrastinating on Procrastination: Using Self-Determination Theory and Motivational Interviewing to Target Basic Psychological Needs, Academic Motivation, and Academic Procrastination. *Current Psychology*.

Overall, I was responsible for developing the topic of this thesis, the research design and methodology, under the supervision and guidance of my supervisor, Dr. Maria Rogers. My thesis committee, including Dr. Veronika Huta, Dr. Patrick Gaudreau, and Dr. Michelle Fortier, contributed to the research methodology through their feedback on my research proposal. For both studies, I was responsible for the ethics submission, participant recruitment, testing of participants, data management and analysis, data interpretation, and the writing of both manuscripts and the larger thesis document. I consulted Dr. Maria Rogers through the entirety of this dissertation process.

For Study 2, Tianyue Dou assisted significantly with the participant recruitment and organization of the intervention (thank you so much!). Briana Goldberg and Ann Hérard were responsible for the MI-coding of the interventions.

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General Introduction

Procrastination—the act of voluntarily delaying an intended course of action—is one of the oldest and most common human behaviours (Steel, 2007). In fact, procrastination was written about as early as 800 BC, with the Greek poet, Hesiod, advising, “Do not put your work off till to-morrow or the day after; for a sluggish worker does not fill his barn nor one who puts off his work” (p. 1413). Despite Hesiod’s advice, transcultural studies have suggested that approximately 15–20% of adults engage in chronic procrastination, despite the adverse personal, academic, social, and occupational consequences (Przepiorka et al., 2019; Loeffler et al., 2019).

Procrastination is a particularly common phenomenon in academic populations. Prevalence rates across post-secondary campuses range from 70–95% (Burka & Yuen, 2008; Kim & Seo, 2011; O’Brien, 2002; Schouwenburg, Lay, Pychyl, & Ferrari, 2004). Procrastination is known as academic procrastination in the academic context. Academic procrastination involves the tasks and activities related to learning and studying and is defined as the act of voluntarily delaying the intended course of study-related behaviours (Steel, 2007; Steel & Klingsieck, 2016).

A significant amount of research has been conducted on academic procrastination to understand the antecedents, consequences, and correlates of this behaviour. However, the question as to why we still engage in this behaviour remains. Moreover, research examining effective strategies for reducing academic procrastination remains scarce. For the remainder of the paper, I will use the term procrastination when referring to academic procrastination.

Consequences of Academic Procrastination

It is well-established that academic procrastination is associated with both negative academic and non-academic outcomes (Grunschel et al., 2013; Hussain & Sultan, 2010; Kim & Seo, 2015; Lay & Schouwenburg, 1993). Negative academic outcomes reported in previous studies have included time pressure, lengthened periods of study, difficulty completing course work, accumulation of work, absenteeism, and course withdrawal (Burka & Yuen, 1983; Grunschel et al., 2013; Lee, 2005; Schraw et al., 2007). In addition to these negative outcomes, some studies have found negative associations between grade point average (GPA) and procrastination (Klassen et al., 2008). However, this association has been inconsistent across studies. For example, Schraw et al. (2007) found that procrastination may negatively affect individuals' health and well-being but did not always impact an individual's GPA. Sæle et al. (2016) found that less procrastination was associated with a more strategic approach to school-related tasks, but it did not predict GPA.

To clarify inconsistencies in the literature, Kim and Seo (2015) conducted a meta-analysis that synthesized previous studies' results. They identified factors that influenced the relationship between GPA and procrastination, including choice of measures, self-reports, and demographic variables. Their results suggested that procrastination is negatively correlated with academic performance.

Negative non-academic outcomes can include affective outcomes such as increased levels of stress (Williams et al., 2008), feeling pressured (Grunschel et al., 2013), guilt (Pychyl et al., 2000), anxiety (Stainton et al., 2000; Tice & Baumeister, 1997), depression (Flett et al., 2016), rumination (Gort et al., 2020), and poor mental health (Stead, Shanahan, & Neufeld, 2010). In addition to the affective consequences, students often experience debilitating physical negative consequences, including sleep-related problems (Grunschel et al., 2013), illness (Tice &

Baumeister, 1997), increased stress (Patrzek et al., 2012), exhaustion, and physical stress reactions (e.g., palpitations; Grunschel et al., 2013).

Causes and Correlates of Academic Procrastination

Although the consequences of procrastination are well-established and relatively consistent across procrastination literature, research on the causes and correlates of procrastination is growing and becoming more specialized. Researchers have examined the antecedents of procrastination from various perspectives, including personality-related factors, affective factors, situational and task characteristics, executive functioning deficits, and motivation as the causes and correlates of procrastination.

Personality-Related Factors. Personality-related factors have been examined frequently in the context of procrastination. This research typically uses personality inventories, such as the big five taxonomies, to explain procrastination (van Eerde, 2003). Results have suggested weak positive correlations between procrastination, openness to experience, and extraversion, as well as weak negative correlations between procrastination, agreeableness, and extraversion. Furthermore, these studies found that lower scores on conscientiousness and higher neuroticism scores were associated with procrastination (Schouwenburg & Lay, 1995). Conscientiousness is the tendency to control impulses and is associated with self-control, which can reduce the likelihood of procrastination (Di Fabio, 2006). Conversely, neuroticism is associated with increased anxiety, depression, and worry, increasing the likelihood of procrastination (Hettema et al., 2006). In addition to the big five personality traits, low self-esteem, low self-efficacy, and high intelligence have also been linked to procrastination (Ferrari, 2000; Hussain & Sultan, 2010; Klassen et al., 2008; Steel, 2007). Although many studies examining personality-related

factors classified procrastination as a personality trait itself, recent research has recommended that procrastination is better explained as a behavioural problem (Steel, 2010).

Affective Factors. Anxiety, depression, shame, guilt, and frustration are associated with procrastination (Beswick et al., 1988; Steel, 2007; Stöber & Joormann, 2001). These factors are often characterized by assumptions, irrational beliefs, or automatic negative thoughts that typically delay tasks (Rozental & Carlbring, 2014). In a study by Uzun et al. (2014), results suggested that procrastination may be associated with an individual's internal thoughts, perceptions, and evaluations more directly than their behaviour. For example, anxiety or depression may result in low self-esteem, increasing the likelihood of an individual deferring a task or an assignment because of self-doubt. Furthermore, these individuals are less likely to persist when faced with problems (Ferrari & Ware, 1992). The relationships between anxiety, depression, and procrastination are often reciprocal, meaning that those who experience depression and anxiety are more likely to procrastinate, and procrastination may also result in increased anxiety and depression (Steel & Klingsieck, 2016).

Situational and Task Characteristics. Previous studies have also examined situational and task characteristics as correlates of procrastination, including attractiveness versus aversiveness of the task (Ferrari & Scher, 2000), the time pressure of the task (Harris & Sutton, 1983), and peer influence (Solomon & Rothblum, 1984). These studies suggest that a task's unpleasantness, combined with an individual's boredom or lack of interest in the task, contributes significantly to task deferral. Furthermore, the more anxiety a task and its constraints produce, the more likely the individual is to procrastinate (Pychyl et al., 2000).

Executive Functioning Deficits. Several studies have suggested that executive functioning deficits can play a significant role in self-regulatory and related processes and may

be involved in procrastination (Rabin et al., 2011). Executive functioning deficits and poor self-regulation can lead to difficulties using internal and external cues to direct goal-oriented actions, poor impulse and emotional control, reduced cognitive skills, poor task persistence, and intention-action gaps (Dewitte & Schouwenburg, 2002; Senecal et al., 1995; Steel, 2007). For example, students with attention-deficit/hyperactivity disorder (ADHD) experience significant executive functioning deficits and, as a result, exhibit less self-regulation and more procrastination behaviour (Fleming & McMahon, 2012; Gingerich et al., 1998). Additionally, these deficits often lead to a lack of crucial planning and organizational skills and the inability to generate strategies when faced with challenges (Zimmerman, 2013). Previous research has suggested links between self-regulation and motivation, as individuals' self-regulation may be reflected in their motivational style (Senecal et al., 1995).

Motivation. The motivational perspective on academic procrastination views procrastination as a motivational or volitional problem (Steel & Klingsieck, 2016). Procrastination is viewed as the result of low quality (i.e., controlled) motivation or a lack of motivation (i.e., amotivation). In contrast, more autonomous forms of motivation result in lower procrastination. The negative relationship between procrastination and autonomous motivation has been consistent across the literature (Cavusoglu & Karatas, 2015; Codina et al., 2018; Pychyl et al., 2000; Schraw et al., 2007; Steel, 2007; Tuckman & Sexton, 1992). The relationship between autonomous and controlled motivation and procrastination has predominantly been examined through the meta-theory of motivation, self-determination theory (SDT).

Self-Determination Theory and Motivation

SDT is a meta-theory for both motivation and personality that posits humans have a natural propensity toward growth and yearn to be causal agents in their own lives (Deci & Ryan,

1985). SDT has been proven useful in explaining students' differential learning strategies, performance, and motivation in the academic context (Deci & Ryan, 2000). This theory highlights the differences between autonomous behaviours (i.e., behaviours that originate from the self), controlled behaviours (i.e., behaviours that are pressured or coerced by intrapsychic or interpersonal forces; Patrick & Williams, 2012), and a lack of motivation (i.e., amotivation). Autonomous behaviours are driven by self-determined or autonomous forms of motivation, whereas controlled behaviours are driven by controlled forms of motivation (Deci & Ryan, 2000). Autonomous motivation refers to personally endorsed or self-referenced reasons for acting (Deci & Ryan, 2000; Chan et al., 2020). Those who experience autonomous motivation act freely and consistently with their values and goals (Teixeria et al., 2020). Controlled motivation, on the other hand, refers to external or internal pressures as reasons for acting. Individuals who experience controlled motivation feel that their behaviour is driven and controlled by external forces (Deci & Ryan, 2000). Amotivation refers to a lack of any motivational force to act. People are typically amotivated when they lack a sense of efficacy or control (Deci & Ryan, 2000).

Intrinsic motivation reflects the most internally regulated, autonomous, and self-determined form of motivation, whereas amotivation is the least internally regulated, autonomous, and self-determined form (Deci & Ryan, 2008). For example, an intrinsically motivated graduate student would work on their dissertation because they are genuinely interested in the topic. Intrinsic motivation is considered the result of the proactive, growth-oriented nature of human beings (Vansteenkiste et al., 2006a). It is a natural, motivational tendency critical to cognitive, social, and physical development, as it uses an individuals' interests to grow knowledge and skills (Ryan & Deci, 2000). Furthermore, it acts as an internal

locus of causality of an individual. Intrinsic motivation is associated with psychological well-being, positive adjustment, higher concentration while studying, better time management, increased school performance, and less procrastination (Fortier et al. 1995; Vansteenkiste et al., 2006b; Vansteenkiste et al., 2006a).

Conversely, extrinsic motivation refers to engaging in behaviours or activities to obtain an outcome or reward that is separate from the behaviour or activity itself (Vansteenkiste & Sheldon, 2006). Extrinsically motivated behaviours are characterized as means-to-an-end behaviour that an individual engages in for a separate consequence (Deci & Ryan, 1985). SDT proposed four different types of extrinsic motivation: external, introjected, identified, and integrated. Extrinsic motivation varies on the extent to which it is controlled. External regulation refers to regulated behaviour through external means, such as rewards or constraints (Vallerand et al., 1993). For example, a graduate student may work on their dissertation because they feel pressured to do so by their supervisor. This type of extrinsic motivation is considered the least autonomous. Introjected regulation refers to when an individual internalizes an external demand which the person uses to approve or disapprove of their actions (Fortier et al., 1995). For example, a graduate student may stay up all night writing their dissertation because they will feel guilty if they do not. Identified regulation refers to when the individual comes to value and judge the behaviour as important and perceives the behaviour as a choice. Integrated regulation refers to when an individual deems the behaviour as consistent with many of their other life goals and values. Because identified and integrated extrinsic motivations are characterized by an internal locus of control and are not statistically distinguishable, they are often combined to form a composite (Vallerand et al., 1993; Vansteenkiste et al., 2004). This composite represents the

most autonomous form of extrinsic motivation. For example, a graduate student may work on their dissertation because they feel it is necessary and aligns with their life goals.

Although initial conceptualizations of intrinsic and extrinsic motivation considered all extrinsic motivation types to reflect a lack of self-determination and motivation, later research has suggested that not all types of extrinsic motivation would be considered controlled motivation (Koestner et al., 1984). The more autonomous forms of extrinsic motivation (i.e., identified and integration) have been associated with positive outcomes. In contrast, the least autonomous forms of extrinsic motivation (i.e., external and introjected) have been associated with negative outcomes (Legault et al., 2006). Previous research has proposed that more autonomous forms of extrinsic motivation provide more persistence when contending with academic challenges, resulting in a protective role against more controlled motivations (Ratelle et al., 2007). For this reason, identified and integration are considered autonomous motivations.

The third type of motivation, amotivation, is neither intrinsically nor extrinsically motivated. Amotivation refers to a lack of motivation and direction (Faye & Sharpe, 2008). When individuals experience amotivation, they perceive their behaviours and outcomes as unrelated and out of control. Amotivation has been linked to learned helplessness, boredom (Vallerand et al., 1993), procrastination (Senecal et al., 1995), low concentration, and higher stress at school and while studying (Baker, 2004). SDT has posited that amotivation may result from others (e.g., professors) actively blocking the satisfaction of students' basic psychological needs.

Basic Psychological Needs Theory

Basic psychological needs theory (BPNT) is one of the sub-theories of the SDT framework. BPNT posits three basic psychological needs (BPN)—autonomy, competence, and relatedness—must be met to ensure well-being, optimal functioning, and psychological development (Deci & Ryan, 2000). The satisfaction or fulfillment of these needs is also considered an important antecedent in the development of more autonomous and intrinsic motivational styles in the family, relationship, friend, school, work, and activities domains (see figure 2; Deci & Ryan, 1985; Milyayskaya & Koestner, 2011). The three needs reflect an individual's natural propensity to feel connected to one another (i.e., relatedness), to feel effective in one's actions (i.e., competence), and to feel volitional and in control of one's behaviour (i.e., autonomy; Deci & Ryan, 1985). More specifically, autonomy refers to volition and agency feelings in the context of one's behaviours and decisions. An autonomous individual understands the causal source of one's behaviours, does not feel pressured to engage in an activity, and understands their ability to make their own decisions. Competence refers to the feeling of self-efficacy or feeling effective in one's actions. Individuals who are competent feel they have the skills to master and overcome challenges (Deci & Ryan, 1985). Relatedness refers to feeling connected to others and having a sense of belonging within one's community.

SDT research has recently shifted focus from solely examining the impacts of BPN satisfaction to examining the impacts of BPN frustration. BPN frustration refers to the active blocking of needs satisfaction (Chen et al., 2015): autonomy is frustrated when individuals feel controlled; relatedness is frustrated when individuals feel excluded; competence is frustrated when individuals experience feelings of failure (Chen et al., 2015). Need frustration is considered a separate dimension of BPN, as research has shown that need frustration contributes more significantly to facets of ill-being (Bartholomew et al., 2011; Chen et al., 2015; Ryan &

Deci, 2006) than lower need satisfaction (Unanue et al., 2014). Need frustration can also foster more controlled forms of motivation or amotivation (Teixeira et al., 2020). Because of this, previous research has examined these concepts individually (Krijgsman et al., 2017).

Need Satisfaction in the Academic Domain

Several studies have demonstrated the importance of need satisfaction in undergraduate students' psychological and emotional well-being (Deci et al., 2001; Faye & Sharpe, 2008; León & Núñez, 2013; Levesque et al., 2004; Niemic & Ryan, 2009). For example, students who experience greater need satisfaction tend to be better adjusted in the classroom, demonstrate greater internalization of class material and experience greater academic achievement (Kelly et al., 2008). Moreover, research has suggested that BPN satisfaction significantly impacts academic motivation, which has important implications for reducing academic procrastination (Boggiano & Ruble, 1979; Milyavskaya & Koestner, 2011).

Faye and Sharpe (2008) examined the interrelationships between BPN, intrinsic motivation, and psychosocial development. They tested a mediation model where identity formation and intimacy, and motivation were mediated by autonomy, competence, and relatedness. Their results suggested that autonomy and competence were significantly associated with intrinsic academic motivation, and partially mediated the relationship between identity formation and motivation. Another study by Milyavskaya and Koestner (2011) found that BPN satisfaction plays a significant role in autonomous motivation and that motivation partially mediates the relationship between need satisfaction and well-being. This suggests that need satisfaction both indirectly and directly impacts well-being in the academic domain. The authors also suggested that the relationship between need satisfaction, motivation, and well-being may form a cycle where need satisfaction in a specific domain leads to more autonomous motivation,

which increases instances of need satisfaction, thus increasing well-being. A further study supported this relationship, as results indicated an association between the frustration of needs and less self-determined outcomes, such as amotivation, and increased fear in students. Previous research, therefore, suggests associations between basic psychological need satisfaction, academic motivation, and, potentially, academic procrastination.

Facilitating the Satisfaction of Basic Psychological Needs

According to SDT, BPN are satisfied within an individual's social environment (Ryan & Deci, 2000). Research has suggested that an environment that provides individuals with autonomy support is essential to developing an individual's perceived locus of causality, volition, and perceived choice (Reeve et al., 2013). Moreover, it is an antecedent to need satisfaction and autonomous motivation (See Figure 1). Autonomy support refers to the behaviours of one person to nurture another person's inner motivational resources (Reeve, 2009). This SDT-based approach has been examined in various social environments, including coaching, exercise, organizations, health care, psychotherapy, and education (Su & Reeve, 2011).

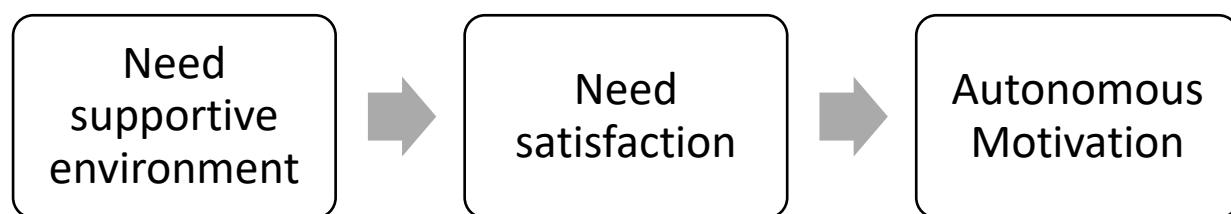
In the academic domain, autonomy support is fostered by providing an autonomy-supportive learning climate. Autonomy-supportive learning climates adopt the students' perspective, provide choice, provide a rationale for assignments, encourage students to share their thoughts, feelings, and behaviours, and support the students' motivational development (Reeve, 2009). Teachers typically provide autonomy support through their interactions with students; however, peers and administrative staff can also support this environment (Edmunds et al., 2007; Rocchi et al., 2017).

In addition to satisfying the BPN, autonomy-supportive learning climates can reduce stress and demands on students, as they focus on the process of learning rather than on grades (Black & Deci, 2000; Ryan & Deci, 2008). Furthermore, autonomy-supportive climates facilitate the process of internalization, which is integral to developing more autonomous forms of academic motivation (Black & Deci, 2000; Deci et al., 1981). SDT research has also demonstrated that an autonomy-supportive instructional style can reduce procrastination behaviours, increase engagement, and positively impact students' academic performance (Black & Deci, 2000; Baker & Goodboy, 2018; Codina et al., 2018; Ryan & Deci, 2017).

In contrast, controlling environments or controlling instructional styles pressure students to think or behave in a specific way. Controlling teacher behaviours include the controlling use of rewards, excessive control or restriction of autonomy, time pressure, excessive surveillance and intimidation (Reeve, 2009). Controlling environments or teaching styles can frustrate the BPN, leading to negative consequences, such as lower quality motivation, procrastination, resistance to learning, or disengagement (Codina et al., 2018; De Meyer et al., 2016).

Figure 1.

Antecedents to Autonomous Motivation According to SDT



Note. Supporting students' BPN through autonomy-supportive environments can move students towards more autonomous forms of motivation.

SDT-Based Interventions

Given the promise of autonomy support in the academic domain, several intervention studies have used autonomy support as an SDT-based approach to satisfy BPN and increase academic motivation. Williams and Deci (1996) tested the effects of an autonomy-supportive learning climate on medical students' autonomy and competence. More specifically, this study tested whether students who perceived their instructors as more autonomy supportive would become more autonomous in their learning, leading to increased competence and more positive psychosocial beliefs. They found that students with autonomy-supportive instructors were more autonomously motivated, experienced more autonomy and competency, and endorsed more positive psychosocial beliefs (Williams & Deci, 1996).

Black & Deci (2000) aimed to replicate the previous study's results by adjusting the classroom structure of an introductory organic chemistry course to be more autonomy supportive. Not only did they find that students' perceptions of leader (i.e., professor) autonomy support predicted significant increases over the semester in their autonomy and competence, but students' perceptions of leader autonomy also predicted a significant decrease in anxiety during the semester, leading to better performance in the course (Black & Deci, 2000). Similarly, Edmunds et al. (2007) found that providing autonomy support in an exercise class increased competence and relatedness need satisfaction, as well as positive affect. More recently, Chang et al. (2016) used a quasi-experimental design to examine whether autonomy support affected self-determined motivation in elementary school physical education students. They found significant increases in perceived teacher autonomy, perceived autonomy, and intrinsic motivation in the autonomy support condition versus the control group (Chang et al., 2016). These studies provide

significant evidence that autonomy-supportive learning climates satisfy students' basic psychological needs and increase their motivation.

Although the theoretical applications of SDT in interventions have yielded positive results regarding academic motivation and suggested mediation of key SDT constructs, such as autonomy support and BPN, none of the previous studies examined procrastination. Additionally, these theory-based interventions lack evidence-based practical applications that can be used consistently in interventions, leading to variability in how the theory is applied (Teixeira et al., 2020). For example, autonomy support was provided using different techniques for all of the previously mentioned intervention studies. Some SDT researchers have suggested integrating SDT and Motivational Interviewing (MI) techniques to address this issue, as MI techniques closely align with SDT's fundamental positions on human growth and motivation. Moreover, MI's practical techniques may provide a better understanding of the development of autonomous motivation through need satisfaction into specific therapeutic practices (Silva et al., 2008).

Motivational Interviewing

MI is a directive, person-centred approach to counselling that endorses a collaborative conversation style as a means of strengthening a person's motivation and commitment to change (Miller & Rollnick, 2013). MI aims to help clients change by exploring and resolving the ambivalence associated with specific behaviours. It has been particularly useful for change-averse individuals. The strategies of MI reflect a more supportive approach to increasing a client's intrinsic motivation as a means of moving them toward change. This approach is grounded in principles that reflect the "spirit" of MI, including acceptance, compassion, collaboration, and evocation (Miller & Rollnick, 2013). Acceptance involves valuing every person's worth and potential, being actively interested in another person's perspective, honouring

their capacity of self-direction, and seeking knowledge about their strengths and efforts (Miller & Rollnick, 2013). Compassion involves actively promoting another person's well-being and understanding that their needs are a priority. Collaborating involves understanding that MI is done "for" and "with" a person, as it is a collaboration between two experts. Finally, evocation involves evoking an individual's own abilities to change.

The therapist incorporates the spirit of MI by expressing empathy, developing discrepancy, rolling with resistance, and supportive self-efficacy (Miller & Rollnick, 2013). The counsellor or facilitator often demonstrates empathy through reflections. These reflections are useful in clarifying, reinforcing, and producing change talk. Change talk (CT) is defined as the opposite of resistance or talk that sustains the individual's current behaviour (Miller & Rollnick, 2002). Developing discrepancy is accomplished by creating a cognitive link between an individual's behaviour and their goals. Rolling with resistance requires the counsellor to avoid the inclination to educate or correct a client when they are resistant to change. Finally, supporting self-efficacy involves supporting a client's confidence. MI assumes that people know themselves and their behaviour and, thus, understand how they should change.

Motivational interviewing uses a fundamental set of skills to move an individual to this realization. These skills are described by the acronym "OARS" which represents the recommendation of using open-ended questions, affirmation, reflections, and summaries. By using these techniques and skills, the facilitator can move through the four processes of MI—engaging, focusing, evoking, and planning—that lead to change. These approaches and principles have been used in various interventions and have frequently been compared to the approaches of SDT-based interventions.

Motivational Interviewing-Based Interventions

MI has predominantly been used to treat health behaviours such as alcohol abuse, drug addiction, weight loss, adherence to treatment, physical activity, and diabetes (Rubak et al., 2005). Within these domains, a significant number of randomized controlled trials (RCT) have been conducted in the past 30 years to test the effectiveness of MI as a clinical method, with many yielding positive results (Borrelli et al., 2010; Fortier et al., 2012; Greaves et al., 2008; Hardcastle et al., 2012; Lundahl et al., 2013). In a recent meta-analysis, Lundahl et al. (2010) examined MI's contribution to various counselling outcomes compared with other intervention strategies, such as CBT. Their results suggested that on average, MI exerts significant, yet small positive effects ($d = .22$) across domains, although it is more effective in some domains compared to others (Lundahl et al., 2010). Moreover, they found that MI was either equally effective or more effective than other types of interventions. Given the effectiveness of MI in these domains, educational researchers have advocated for research involving MI in the academic domain as a means of improving student outcomes

Emerging evidence has suggested that MI may be a useful approach for education-based interventions, as it can be effective with a limited number of sessions and easily disseminated (Snape & Atkinson, 2016; Terry et al., 2013). Furthermore, MI has been shown to work well with children and young adults due to the focus on autonomy and collaboration. This is useful in facilitating independence and identity formation (Snape & Atkinson, 2016). A study by Strait et al. (2012) tested the efficacy of MI in the promotion of academic achievement in middle school students. The students in the MI condition participated in a single 50-minute session of MI. Compared to the control group, students who received MI increased their class participation, academic behaviour, and math grades. A replication study by Terry et al. (2013) supported and advanced these results by finding a significant overall effect of the MI intervention in the one-

session and two-session groups, with the effect being larger in the two-session groups. Unlike the previous two studies, Reich et al. (2015) focused on increasing motivation to improve academic performance. They examined whether a brief classroom-based MI intervention would increase undergraduates' motivation to study for exams. Their results indicated improved exam performance following the brief intervention, providing evidence of MI's effectiveness as a clinical approach for increasing academic performance.

Snape and Atkinson (2016) recently conducted a meta-analysis of eight studies that examined MI's effectiveness in educational settings. Seven of the studies provided supportive evidence, while only one found neutral results. The studies that supported MI in educational settings found improvements in attendance and punctuality (Atkinson & Woods, 2003), an increase in positive attitudes towards school (Cryer & Atkinson, 2015), and increased grades in math, science, and history (Terry et al., 2014). A study that focused on career development found that MI increased vocational skills, self-efficacy, and self-determination (Sheftel et al., 2014). The authors of the meta-analysis concluded that there was sufficient evidence to suggest that MI has small to medium positive effects on academic achievement.

Despite these promising results, further research is needed to identify the most effective way of using MI in the academic domain and whether there are any long-term effects of these interventions. Given that MI-based interventions have been criticized for their lack of a theoretical foundation—with the founders of MI even noting that it may be time to move toward a theory of MI (Miller & Rose, 2009)—as well as SDT being criticized for not using evidence-based practices, it is intuitive to explore the use of MI in the context of SDT. The marriage of these two approaches would address criticism associated with each.

Motivational Interviewing and SDT

Both MI and SDT share similar views when it comes to an individual's capabilities. These approaches assert that an individual possesses a natural tendency and ability towards personal development and change (Vansteenkiste & Sheldon, 2006). Additionally, both SDT and MI have drawn on Rogers' client-centred approach and, thus, the underlying frameworks of the two are similar (Patrick & Williams, 2012). Moreover, both approaches aim to elicit motivation from people by supporting their needs and reinforcing their capabilities.

The techniques used in MI allow facilitators to satisfy their clients' basic psychological needs, subsequently increasing their motivation to change. Moreover, several of the techniques used in MI align with those in SDT-based interventions. For example, in MI, the facilitator develops an empathic relationship with the client to understand and acknowledge their feelings and perspective. Engaging in this empathic relationship would likely satisfy a client's need for relatedness (Vansteenkiste & Sheldon, 2006; Patrick & Williams, 2012; Teixeira et al., 2020). Rolling with resistance, on the other hand, involves allowing a person to acknowledge their behaviour without arguing or telling them what to do. This approach may satisfy the need for autonomy, as the facilitator allows the individual to make choices for themselves. In SDT-based interventions, this is referred to as providing choice (Teixeira et al., 2020). Eliciting discrepancy between a client's goals and behaviours may also satisfy an individual's autonomy needs. This process is likely to elicit a client's personal decision to make changes to their behaviour, thereby supporting their autonomy. This is similar to the SDT technique of exploring goals and values and providing a meaningful rationale (Teixeira et al., 2020). Finally, MI supports an individual's feelings of self-efficacy by enhancing an individual's perception of their confidence in making change. Supporting self-efficacy would lead to the satisfaction of the need for competence. This

technique would involve constructive feedback, which is used in SDT interventions (Teixeira et al., 2020).

In addition to applying the key principles in MI to satisfy the BPN of individuals, MI provides an autonomy-supportive environment, which has also been determined by SDT as a crucial component for positive outcomes in various domains. In fact, MI may be useful in providing new insights into how to better provide an autonomy-supportive environment, above and beyond the main tenets of SDT. For example, MI emphasizes reflective listening and summarization, which increases self-awareness and facilitates autonomous decision-making. Additionally, MI advocates using open questions because it allows clients to explore their thoughts and feelings regarding their behaviour. Although several interventions have been developed in the physical activity domain (Fortier et al., 2007; McFadden et al., 2017), there have been no interventions in the academic domain that have utilized the two approaches, despite successful separate applications of each. By using MI-based approaches, SDT-based interventions will have more evidence-based, practical approaches to providing an autonomy-supportive environment and supporting BPN satisfaction—both of which will lead to more autonomous motivation and reduced procrastination.

Procrastination Interventions

Despite the potential implications for interventions based on SDT and MI, most procrastination interventions thus far have used a variety of cognitive and behavioural strategies, such as time management (Häfner, Oberst, & Stock, 2014), acceptance and commitment therapy (Glick & Orsillo, 2015; Scent & Boes, 2014), and cognitive behavioural therapy (CBT) techniques (Nordby et al., 2016; Toker & Avci, 2015). For example, in the intervention study by Häfner et al. (2014), the effects of a short-term time management intervention were examined.

The intervention was described as a four-hour program that included modules on strategies for reaching participants' goals, daily planning, and implementation intentions (i.e., plans for implantation and why). After one month, participants experienced increases in the time spent on their important tasks.

In an acceptance and commitment therapy intervention by Scent and Boes (2014), two one-and-a-half-hour small group workshops were administered. The two workshops were spaced one week apart. The workshops focused on a three-step process for responding to procrastination behaviour. These three steps included inserting a mindful pause, accepting and defusing, and choosing to act. The steps were used to help participants recognize procrastination as avoidance of unwanted thoughts and feelings, the potential behaviours possible during these experiences, and the conscious connection of goals and behaviours (Scent & Boes, 2014). Although no statistical analyses were conducted, the feedback from the participants suggested that the workshops were helpful in interrupting the procrastination cycle. Glick and Orsillo (2015) conducted a similar study to Scent and Boes (2014), as they tested an intervention based on acceptance and commitment therapy. Unlike Scent and Boes (2014), however, this study also included a time-management intervention. Both interventions were 20-minute programs delivered through an online video with corresponding PowerPoint slides (Glick & Orsillo, 2015). In the time-management intervention, participants were educated on the causes of procrastination and potential strategies. In the acceptance and commitment intervention, the participants were provided information related to their emotions and experiential avoidance, mindfulness, and academic values. Their results suggested that individuals in the time-management intervention completed more reading than the students in the acceptance and commitment intervention.

However, neither intervention led to statistically significant differences on behavioural procrastination.

Because procrastination has been associated with negative thinking patterns, CBT strategies have been used in procrastination interventions. Toker and Avci (2015) examined the effectiveness of a CBT psych-educational group program on academic procrastination behaviours. Their intervention consisted of eight 90-minute group education sessions. The sessions' content focused on automatic thoughts, intermediate thoughts related to participants' procrastination behaviour, and core beliefs developed during childhood (Toker & Avci, 2015). The intervention also included a combination of problem-solving, cognitive, and behavioural techniques. Results showed decreases in the participants' procrastination scores, which were observed on a retention test one month after they participated. Another CBT-based intervention conducted by Nordby et al. (2016) found similar results. Their intervention had a duration of four weeks, with a total of four lectures and two seminars. The content of the lectures and seminars included a combination of techniques found in previous procrastination interventions, such as providing information about procrastination, task management, and planning, as well as identifying irrational thoughts and emotions, and other CBT techniques. Their results suggested significant reductions in procrastination. Individuals with high procrastination prior to the intervention showed the most significant reductions in procrastination scores ($\eta^2 = .25$). However, changes in motivation were not observed (Nordby et al., 2016).

Although some of these interventions found promising results in terms of reducing procrastination behaviours, none of these interventions used SDT as a theoretical framework or focused on increasing motivation as a means of reducing procrastination. Moreover, all of these

interventions have focused solely on the students' personal antecedents that contribute to procrastination, rather than environmental antecedents.

Rationale for Current Study

Given that previous research has suggested the significant role of motivational factors as correlates of procrastination, it may be useful to examine it through the lens of SDT. More specifically, it may be helpful to examine whether supporting the needs of undergraduate students can lead to differences in the quality of their academic motivation and, subsequently, contribute to lower academic procrastination. Examining all of these variables may provide valuable information about the possible avenues for intervention. The use of SDT as a theoretical framework and MI as a set of techniques would improve upon previous interventions targeting procrastination, as it will use an evidence-based approach to target academic motivation and procrastination through the satisfaction of students' BPN.

Overview of Current Research

Broadly, the goal of the present research is to examine the relationships between BPN, academic motivation, and academic procrastination, and develop and implement an intervention targeting academic procrastination. Although there has been previous research examining the relationships between BPN and academic motivation, as well as academic motivation and academic procrastination, there have been few studies thus far that have examined these relationships together (Cavusoglu & Karatas, 2015; Codina et al., 2018). The first study built upon previous research by examining the role of BPN satisfaction and frustration and their relationships with the different types of academic motivation and academic procrastination. Furthermore, it tested mediation models where academic motivation mediated the relationship between BPN satisfaction and frustration and academic procrastination. The second study

included designing, implementing, and evaluating a brief intervention that used SDT as a theoretical framework and MI techniques. This intervention targeted the BPN as a means of increasing autonomous motivation and decreasing academic procrastination. The second part of Study 2 aimed to replicate the results from the Study 1 mediation model. I hope that these studies can be used to better understand the relationship between BPN, academic motivation, and academic procrastination, and to develop effective intervention strategies.

**Study 1: Academic Procrastination in Undergraduate Students: Understanding the Role of
Basic Psychological Need Satisfaction and Frustration and Academic Motivation**

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Abstract

Procrastination is the act of voluntarily delaying an intended course of action, despite negative consequences associated with the delays. It is particularly prevalent in the post-secondary student population, with prevalence rates ranging between 70–95%. Unlike other populations, students primarily engage in academic procrastination, which is the voluntary delay of tasks and activities related to learning and studying. Students have consistently cited motivation, or a lack thereof, as one of the main sources of their procrastination. One of the most prominent theories explaining motivation is Self-Determination Theory (SDT). SDT posits that motivation results from the satisfaction of the basic psychological needs (BPN)—autonomy, competence, and relatedness. Despite the direct links between motivation and procrastination, procrastination has been scarcely examined through the lens of SDT. For this reason, the current study examined the relationship between BPN satisfaction and frustration, academic motivation, and academic procrastination. A sample of 617 undergraduate students completed an online questionnaire about their university experience. Data was analyzed using mediational structural equation models. Results suggested that the different types of academic motivation significantly mediated the relationship between BPN satisfaction and procrastination, but not the relationship between BPN frustration and procrastination. These results demonstrate the importance of satisfying the BPN of undergraduate students, as it may increase their academic motivation and, subsequently, reduce their procrastination.

Introduction

Most people are all too familiar with putting off tedious tasks and responsibilities until the last minute as a means of delaying the inevitable stress, inconvenience, or other negative emotions associated with them. This behaviour is known as procrastination—the act of voluntarily delaying an intended course of action, despite the negative consequences associated with the delays (Steel, 2007). In addition to the negative consequences associated with task delay, procrastination is associated with poor mental health, lower performance, and overall decreased well-being (Tice & Baumeister, 1997).

According to recent research, students have the highest prevalence rates of procrastination, ranging from 70–95% (Burka & Yuen, 2008; O’Brien, 2002; Schouwenburg et al., 2004). Because of this, a considerable amount of recent research has focused on procrastination in the academic context, referred to as academic procrastination. Academic procrastination is restricted to the tasks and activities related to learning and studying (Steel & Klingsieck, 2016). It is defined as the act of voluntarily delaying the intended course of study-related behaviours (Steel, 2007). Research has investigated the consequences, causes, and correlates of procrastination as a means of informing the development and implementation of interventions for students. For the remainder of the paper, I will use the term procrastination when referring to academic procrastination.

Consequences of Procrastination

Procrastination has been consistently associated with negative academic and non-academic outcomes (Aremu et al., 2011; Grunschel et al., 2013; Hussain & Sultan, 2010; Kim & Seo, 2015; Lay & Schouwenburg, 1993; Rothblum et al., 1986). In terms of negative academic outcomes, procrastination has been associated with extended periods of study, difficulty

completing course work, absenteeism, and course withdrawal (Burka & Yuen, 2008; Lee, 2005; Schraw et al., 2007). Although many studies have suggested a negative association between procrastination and grade point average (GPA; Kim & Seo, 2015), other studies have failed to find evidence supporting this association (Schraw et al., 2007).

In terms of non-academic outcomes, procrastination has been associated with both negative affective and health-related outcomes. Students often suffer from sleep-related problems (Grunschel et al., 2013), increased levels of stress (Williams et al., 2008), physical illness (Tice & Baumeister, 1997), exhaustion, physical stress reactions (e.g., palpitations; Grunschel et al., 2013), and poor mental health (Stead, Shanahan, & Neufeld, 2010). Furthermore, the affective outcomes of procrastination are equally debilitating. Previous research has suggested links between procrastination and feelings of guilt, decreased confidence, depression, anxiety, and low self-esteem (Tice & Baumeister, 1997).

Motivation and Procrastination

Despite increased research regarding the consequences of procrastination, procrastination causes and correlates are still poorly understood. Previous research has studied personality-related factors (e.g., neuroticism), affective factors (e.g., depression), situational and task characteristics (e.g., time constraints), executive functioning deficits (e.g., self-regulation), and motivation (e.g., autonomous motivation) as the causes and correlates of procrastination. One of the most frequently studied relationships is that of procrastination and motivation. Researchers have argued that the “mysterious character of procrastination vanishes when a motivational rather than volitional construal, such as self-regulatory failure, are considered” (Grund & Fries, 2018).

The motivational perspective on procrastination views procrastination as a motivational problem rather than a trait- or skill-related problem (Senecal et al., 1995). According to this perspective, those who have higher quality (i.e., autonomous) motivation are less likely to engage in procrastination than those with low quality (i.e., controlled) motivation (Mouratidis et al., 2017). This notion was supported by a study by Klingsieck et al. (2013), in which participants indicated that they felt they procrastinated because they were not intrinsically motivated and lacked interest in the tasks. Another study conducted by Vij and Lomash (2014) found that a lack of intrinsic academic motivation significantly increased the likelihood of procrastination. Their results also suggested that those who expressed more controlled motivation types (i.e., external regulation) or amotivation were more likely to procrastinate. These findings are consistent with other studies that have also found that low intrinsic motivation and high amotivation contribute to procrastination (Cavusoglu & Karatas, 2015; Pychyl et al., 2000; Schraw et al., 2007; Steel, 2007; Tuckman & Sexton, 1992).

Self-Determination Theory and Motivation

Motivational correlates have been explained by several different theories, with one of the most prominent being Self-Determination Theory (SDT). SDT is a macro theory of human motivation and personality that has been used to explore and better understand students' academic motivation (Ryan & Deci, 2000). SDT posits two different types of motivation—autonomous and controlled—that energize and drive behaviour. Autonomous motivation comprises intrinsic and extrinsic motivations that reflect the identification of an activity's value and integration of it within their sense of self (Deci & Ryan, 2008). When individuals are autonomously motivated, they engage in activities because they are inherently enjoyable or in line with one's values, goals, and priorities.

On the other hand, controlled motivation comprises external regulation and introjected regulation, which reflect motivations produced by external contingencies (e.g., rewards) or external pressures (e.g., avoidance of shame). When individuals experience controlled motivation, they engage in behaviours initiated by external or internal pressures on the self (Vansteenkiste & Sheldon, 2006). These motivation types often fall along a continuum of being more or less self-determined (Ryan & Connell, 1989).

According to SDT, there are three basic psychological needs (BPN)—autonomy, competence, and relatedness—necessary for developing more autonomous or self-determined forms of motivation. These needs are typically satisfied by an individual's social environment (Ryan & Deci, 2000). Autonomy refers to feeling a sense of choice, willingness, and volition of one's behaviour (Deci & Ryan, 1985). Competence refers to self-efficacy or feeling effective in one's actions or interactions with the environment. Competent individuals feel they can exercise their capacities in challenging situations (Deci & Ryan, 1985; Litalien et al., 2017). Relatedness refers to feeling connected to others and cared for by others. When the BPN are satisfied, individuals experience growth, integrity, and well-being (Ryan & Deci, 2000).

The importance of need satisfaction in both the psychological and emotional well-being of undergraduate students is well-established in previous research (Deci et al., 2001; Faye & Sharpe, 2008; León & Núñez, 2013; Levesque et al., 2004; Niemic & Ryan, 2009). This research has shown that students who experience BPN satisfaction tend to have better academic outcomes due to better classroom adjustment, greater internalization of class material, and more autonomous forms of academic motivation (Boggiano & Ruble, 1979; Kelly et al., 2008; Milyavskaya & Koestner, 2011). Autonomous forms of motivation have been shown to mediate

the relationship between BPN satisfaction and other well-being measures (Milyavskaya & Koestner, 2011; Weman-Josefsson et al., 2015).

When the satisfaction of the needs is actively blocked, BPN frustration may occur. The active blocking of BPN results in more negative outcomes than lower need satisfaction (Unanue et al., 2014). BPN frustration manifests in individuals who feel controlled by others (i.e., autonomy frustration), feel incompetent due to a lack of self-efficacy (i.e., competence frustration), or feel directly excluded by others (i.e., relatedness frustration). BPN frustration has been shown to result in more controlled motivations or a lack of motivation entirely (Oram et al., 2020). When BPN satisfaction and frustration were examined individually in a study by Krijgsman et al. (2017), results suggested an association between the frustration of needs, less self-determined motivation (i.e., amotivation), and increased fear in students. Although research examining BPN frustration in the academic domain is relatively scarce, the existing research has demonstrated that BPN frustration can influence students' perception of their school environment (Liu et al., 2017).

SDT, Motivation, and Procrastination

Relationships between autonomy support, BPN satisfaction, and academic motivation are well-established, as is the relationship between the different types of academic motivation and procrastination. Moreover, research has shown that autonomous motivation is a mediator between BPN satisfaction and other well-being outcomes. Despite these findings, few studies have examined BPN satisfaction, academic motivation, and procrastination. Cavusoglu and Karatas (2015) examined whether academic motivation mediated the relationship between BPN satisfaction and procrastination. Their results were consistent with previous literature (Cerino, 2014; Katz et al., 2014) and suggested that academic motivation is a predictor of procrastination.

Furthermore, they found that the satisfaction of the BPN were direct predictors of amotivation and intrinsic motivation, thus indicating an indirect relationship between BPN and procrastination. A more recent study by Codina et al. (2018) examined the relationships between controlling and autonomy-supportive teaching behaviours, need satisfaction, and procrastination. Their results suggested that need satisfaction was negatively associated with procrastination. However, this study did not examine the relationship between BPN satisfaction, motivation, procrastination, or BPN frustration and procrastination.

Although these studies were useful in the preliminary analyses of these relationships, several limitations should be addressed in future studies. First, neither study examined need frustration and how it may relate to academic motivation and procrastination. Recently, need frustration has been considered a crucial mechanism in optimal and non-optimal functioning, as it may uniquely contribute to non-optimal functioning (Chen et al., 2015; Vansteenkiste & Ryan, 2013). Second, Cavusoglu and Karatas (2015) created composites for amotivation, extrinsic motivation, and intrinsic motivation. Previous research has shown that the more autonomous forms of extrinsic motivation (i.e., identified and integrated) can increase engagement (Connell & Wellborn, 1991), quality of learning (Grolnick & Ryan, 1987), and overall well-being (Ryan & Deci, 2000). Given the potential adaptive functions of some forms of extrinsic motivation, the distinction between autonomous and controlled motivation may be more appropriate and informative than the distinction between intrinsic and extrinsic motivation (Shahar et al., 2003). This may also explain why the authors did not find the BPN as significant predictors of extrinsic motivation.

The Current Study

Despite interesting and novel findings, the previous studies did not examine the relationships between BPN satisfaction and frustration, autonomous and controlled motivation, amotivation, and procrastination in a general undergraduate population. The current study aims to support and extend these previous studies by examining the relationships between all of the variables.

Hypotheses

1. There will be significant positive relationships between BPN satisfaction and autonomous motivation.
2. There will be significant negative relationships between BPN satisfaction, controlled motivation, amotivation, and procrastination.
3. There will be significant negative relationships between BPN frustration and autonomous motivation.
4. There will be significant positive relationships between BPN frustration, controlled motivation, amotivation, and procrastination.
5. Autonomous motivation, controlled motivation, and amotivation will be significant mediators in the relationships between BPN satisfaction and frustration, and procrastination.

Method

Participants

Participants in the current study were undergraduate students ($N = 712$) from a large Canadian university. Students were recruited through advertisements on campus and a research participant pool in which students receive course credit for participation in studies. Participants were removed if they completed less than 50% of the survey ($n = 68$) and if they completed the

survey in under 12 minutes ($n = 27$), as the survey was estimated to take approximately 12-15 minutes minimum. Of the remaining sample ($n = 617$), approximately 75% of participants were between the ages of 18–20 ($n = 461$) and 20% were between the ages of 21–25 ($n = 122$). The majority of participants were female ($n = 452$) and in their first year ($n = 367$). Participants identified as Caucasian ($n = 329$), Asian ($n = 104$), Arabic ($n = 52$), African-American ($n = 47$), Aboriginal ($n = 8$), Hispanic ($n = 6$), while some indicated other ($n = 63$) or declined to answer ($n = 8$). Students were enrolled in a number of programs, such as psychology ($n = 97$), nursing ($n = 78$), business ($n = 14$), economics ($n = 15$), and other ($n = 413$). When asked “*to what degree do you procrastinate on school activities in general*”, approximately 73% of participants indicated at least sometimes.

Measures

Demographics Questionnaire

Participants provided basic information regarding their age, gender, first language, socioeconomic status, and ethnicity. Participants also provided information regarding previous or current mental health diagnoses and any past or current treatment. Additionally, the participants provided information related to their academic standing and past or current use of academic services.

BPN Satisfaction and Frustration Scale

The BPN Satisfaction and Frustration scale – work domain (BPNFS; Chen et al., 2015; Schultz et al., 2015) is a 24-item scale that assesses the levels of autonomy, competence, and relatedness satisfaction and frustration. Three subscales represent each need’s satisfaction and frustration. The scale was adapted for the university context. Examples of need satisfaction items

include, “*At school, I feel a sense of choice and freedom in the things I undertake*”, “*I feel confident that I can do things well at school*”, and “*I feel that the people I care at school about also care about me.*” Examples of need frustration items include “*I feel pressured to do many things at school*”, “*I feel disappointed with my performance at school*”, and “*I feel excluded from the group I want to belong to at school*”. Items are responded to on a 7-point Likert scale, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*), with higher scores indicating either higher need satisfaction or frustration. Internal consistency was sufficient among all subscales (Chen et al., 2015; Cordeiro, Paixao, Lens, Lacante, & Luyckx, 2016; Schultz et al., 2014). In the current study, the satisfaction items and frustration items were randomly assigned to three parcels. The satisfaction parcels had a Cronbach’s alpha of .89, and the frustration parcels had a Cronbach’s alpha of .85.

Academic Motivation Scale

The Academic Motivation Scale (AMS; Vallerand et al., 1992) is a 28-item scale developed to measure the various dimensions of motivation in the post-secondary population. The scale is comprised of seven subscales that measure three types of intrinsic motivation (i.e., to know, toward accomplishment, and to experience stimulation), three types of extrinsic motivation (i.e., identified, introjected, and external regulation), and amotivation. Examples of items include, “*For the pleasure I experience while I am surpassing myself in one of my personal accomplishments*”, “*In order to obtain a more prestigious job later one*”, and “*I don’t know; I can’t understand what I am doing in school*”. Each of the subscales is comprised of four items, which are rated on a 7-point Likert-Scale, ranging from 1 (*does not correspond at all*) to 7 (*corresponds exactly*). Higher scores on subscales indicate a high endorsement of that specific type of academic motivation (Fairchild et al., 2005). Parcels were created from subscale items to

reflect the constructs of autonomous and controlled motivation. In order to ensure that the latent constructs of autonomous motivation and controlled motivation were accurate, we conducted a principal components analysis. The eigen values, scree plot, and factor loadings suggested a three-factor solutions with items corresponding to the appropriate latent construct. Items were randomly assigned to four parcels for autonomous and four parcels for controlled motivation. Given that previous research has indicated that identified motivation reflects more autonomous extrinsic motivation, these items were included in the autonomous motivation parcels (Vallerand et al., 1993; Vansteenkiste et al., 2004). Because the amotivation subscale consists of only four items, this construct was not parcelled. In the current study, the Cronbach's alpha across the autonomous motivation parcels was .92, .87 for controlled motivation, and .89 for amotivation.

Procrastination Assessment Scale for Students

The Procrastination Assessment Scale for Students (PASS; Solomon & Rothblum, 1984) is a two-part, 44-item self-report measure assessing procrastination in students. For our study, only part 1 was used. In part 1, there are 18 items in which students rate the extent to which they procrastinate in six academic areas (i.e., writing a term paper, studying for exams, keeping up with weekly reading assignments, academic administrative tasks, attendance tasks, and school activities in general). They also assess the degree to which procrastination on the task is a problem and the extent to which they want to decrease the tendency to procrastinate on the task. Each of these parts includes three items rated on a 5-point Likert scale. The first item for each task is used to determine the frequency of procrastination on tasks (e.g., *To what degree do you procrastinate on writing a term paper*) and ranges from 1 (*never procrastinate*) to 5 (*always procrastinate*). The second item for each task is used to measure the degree to which procrastination on this task was a problem (e.g., *To what degree is procrastination on writing a*

term paper a problem for you) and ranged from 1 (*not at all a problem*) to 5 (*always a problem*). Finally, the third scale measured the degree to which the individual wants to decrease their tendency to procrastinate on the task (e.g., *To what extent do you want to decrease your tendency to procrastinate on writing a term paper?*) ranging from 1 (*do not want to decrease*) to 5 (*definitely want to decrease*). The first two items from the six sections of the PASS were used to create a mean procrastination score, as per scoring instructions from the authors (Solomon & Rothblum, 1984). These items were randomly assigned to three parcels. Across the three parcels, the Cronbach's alpha was .96.

Procedure

The University's Research Ethics Board provided ethical approval for the current study. Undergraduate students voluntarily participated in this study through an online research pool and organized by the university, as well as advertisements on campus. Participants were required to provide consent before they participated in the study. After consent was obtained, participants completed a brief online survey about their university experience. The participants were given two weeks to complete the survey. After two weeks, the survey was locked. Participants were compensated with one course-credit or entered into a draw for a \$50 gift-card within two weeks of study completion.

Results

Preliminary Analyses

Data screening. Of the total sample, only 0.8% of the data points were missing. Little's MCAR test results were non-significant (MCAR $\chi^2_{(24)} = 18.22, p = .79$), which indicated that there was no significant relationship between missingness on a given variables and the score on

another variable. Given the low percentage of missing data and a non-significant Little's MCAR test, the expectation-maximization method was used for imputation (Carter, 2006). Outliers were Winsorized to retain data.

Table 1.

Means, Standard Deviations, Skewness, and Kurtosis

	<i>M</i>	<i>SD</i>	Skewness	Kurtosis
BPN Satisfaction	4.95	0.93	-0.14	-0.16
BPN Frustration	3.62	1.02	0.05	-0.09
Autonomous Motivation	4.83	1.02	-0.22	0.14
Controlled Motivation	5.37	1.05	-0.66	0.33
Amotivation	2.13	1.34	1.23	0.80
Procrastination	3.00	0.78	0.20	0.32

Note. BPN Satisfaction = Basic psychological need satisfaction; BPN Frustration = Basic psychological need frustration

Means, Standard Deviations, and Correlations. Means, standard deviations, skewness, and kurtosis of the observed variables are included in Table 1. Zero-order latent variable correlations are included in Table 2. In preliminary analyses, demographic (e.g., gender and age) differences in all variables were examined. There were no significant differences between age on any of the variables; however, there were significant differences between gender on the motivation variables. For this reason, we ran the models with gender having a direct relationship with procrastination to determine whether the types of motivation were being confounded with gender. These models were then compared to the models without gender. The relationship

between the types of motivation and procrastination was virtually unchanged; therefore, we decided to exclude gender in the model.

Table 2.

Zero-order latent variable correlations

	1.	2.	3.	4.	5.	6.
1. BPN Satisfaction	--	-.65**	.54**	.19**	-.46**	-.38**
2. BPN Frustration	--	--	-.30**	.06	.49**	.41**
3. Autonomous Motivation	--	--	--	.44**	-.35**	-.31**
4. Controlled Motivation	--	--	--	--	-.09**	-.08*
5. Amotivation	--	--	--	--	--	.29**
6. Procrastination	--	--	--	--	--	--

Note. BPN Satisfaction = Basic psychological need satisfaction; BPN Frustration = Basic psychological need frustration

** $p < .001$, * $p < .05$

Structural Model

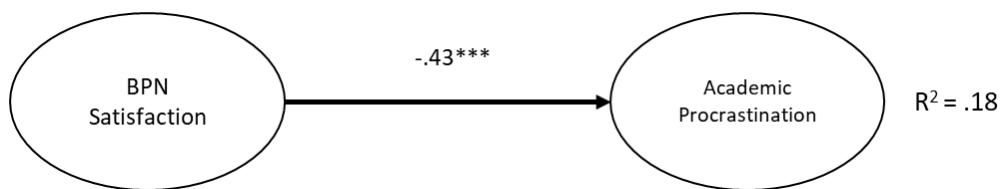
All models were tested using AMOS statistical software. Observed variables were used to create latent factors. Maximum likelihood estimation and bootstrapping was used for indirect and direct effects. The distributions of all variables were examined using skew and kurtosis statistics. All skew and kurtosis values were $<|2|$, and, thus, the distribution of the data was considered

acceptable (Miles & Shevlin, 2001). Structural equation modelling (SEM) was employed, as it takes a confirmatory approach to the analysis of a structural theory (Byrne, 2001).

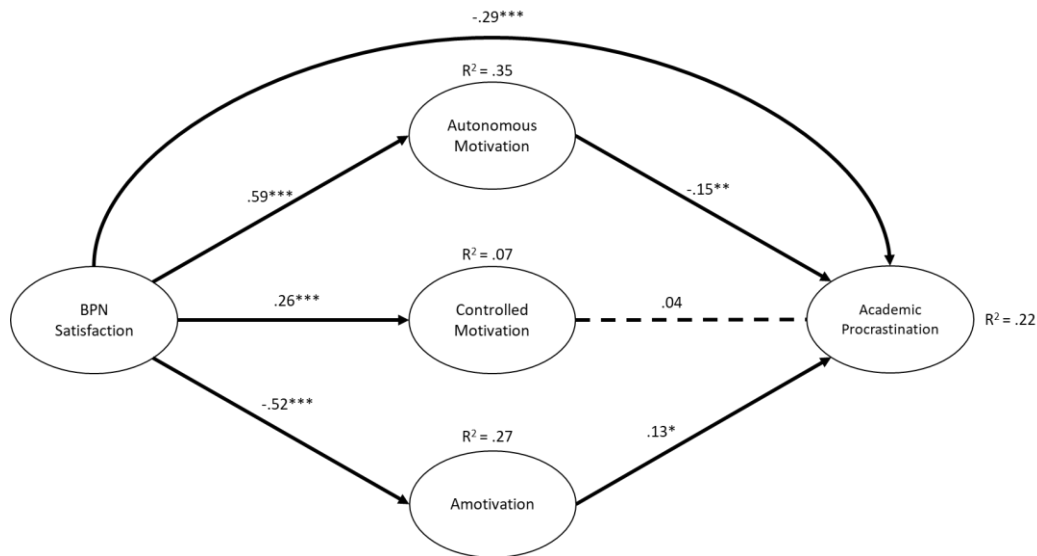
In line with recommendations of Byrne (2001), the fit of the models was evaluated using several goodness of fit indices, including the chi square statistic (χ^2), Comparative Fit Index (CFI), and the Root Mean Square Error of Approximation (RMSEA). Ideally, a model with good fit would have a non-significant χ^2 ; however, χ^2 will almost always be statistically significant with larger sample sizes (Iacobucci, 2010). Furthermore, there is little statistical or logical foundation for the normed chi-square (Kline, 2016). Despite these limitations, it is recommended to report the model chi-square value with its degrees of freedom in addition to other fit indices such as the CFI, SRMR, and RMSEA (Kline, 2016). CFI and TLI values larger than .90 indicate acceptable fit, whereas values larger than .95 suggest good fit (Bentler, 1990; Bentler, 1992; Hu & Bentler, 1999). Moreover, RMSEA values less than .05 indicate excellent fit, and values as high as .08 represent acceptable fit (Byrne, 2001). Finally, SRMR values less than .08 represent acceptable model fit.

Figure 1.

Direct Effects Model with BPN Satisfaction



Note: The direct effects model examining the relationship between BPN satisfaction and procrastination, prior to adding the mediators to the model ($p < .001^{**}$).

Figure 2.*Mediation Model with BPN Satisfaction*

Note: Structural mediation model. Solid lines represent statistically significant relationships ($p < .001^{***}$, $p < .01^{**}$, $p < .05^*$). Dotted lines indicate non-significant relationships.

BPN Satisfaction

BPN satisfaction was significantly and negatively associated with procrastination ($\beta = -.43$, $p \leq .001$) in the direct effects model. Figure 3 depicts the results from the structural mediation model with BPN satisfaction, autonomous motivation, controlled motivation, and amotivation, including their hypothesized paths and corresponding standardized estimates. The proposed model provided an acceptable fit: $\chi^2(197) = 4.01$, $p \leq .01$, CFI = .95, TLI = .94, RMSEA = .070, and SRMR = .085. Standardized factor loadings are presented in Table 3. All factor loadings of latent variables were within an acceptable range (Ertz et al., 2016).

This model showed that BPN satisfaction was significantly and positively associated with autonomous motivation ($\beta = .59, p \leq .001$), controlled motivation ($\beta = .26, p \leq .001$), and negatively with amotivation ($\beta = -.52, p \leq .001$). Autonomous motivation was negatively associated with procrastination ($\beta = -.15, p \leq .01$), whereas amotivation was positively associated with procrastination ($\beta = .13, p \leq .05$). Controlled motivation was not significantly associated with procrastination ($\beta = .04, p = .43$).

The standardized direct path from BPN satisfaction to procrastination was statistically significant after the mediators were included in the model ($\beta = -.29, p \leq .001$). The standardized indirect path of BPN satisfaction to procrastination was also statistically significant when considering all mediators ($\beta = -.40, p \leq .001$). This indicates that autonomous and controlled motivation, and amotivation—together—play a significant role in the relationship between BPN satisfaction and procrastination. Sobel tests were conducted to examine the indirect effects individually. This revealed that autonomous motivation ($z = -2.62, p \leq .01$) and amotivation ($z = -2.34, p \leq .05$) were significant mediators in the relationship between BPN satisfaction and procrastination. In total, the variables in this structural equation model accounted for 22% of the variance in procrastination.

Table 3.

Latent Factor Loadings for BPN Satisfaction Mediation Model

Parcel	Factor Loading
BPN SAT	
1	.86
2	.92
3	.80
Autonomous Motivation	
1	.80
2	.89
3	.90

4	.87
Controlled Motivation	
1	.67
2	.74
3	.87
4	.87
Amotivation	
1	.85
2	.78
3	.82
4	.83
Procrastination	
1	.70
2	.79
3	.76

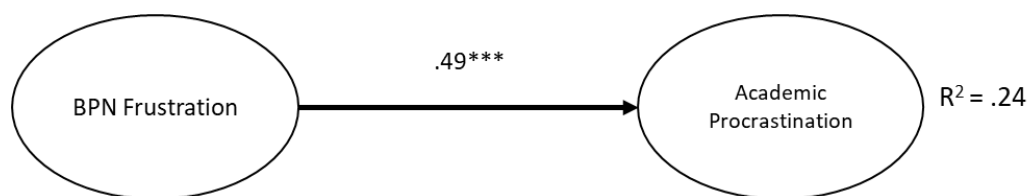
Note. BPN SAT = Basic psychological need satisfaction.

BPN Frustration

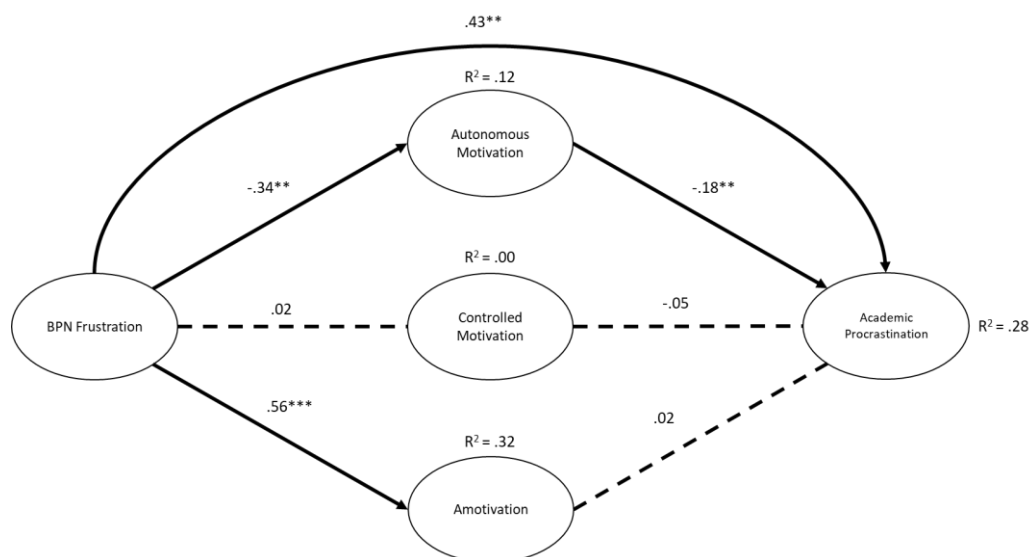
A model examining whether autonomous motivation, controlled motivation, and amotivation would mediate the relationship between BPN frustration and procrastination was also tested. First, a direct effects model was tested (Figure 4). BPN frustration significantly and positively predicted procrastination ($\beta = .49, p \leq .001$).

Figure 3.

Direct Effects Model with BPN Frustration



Note: The direct effects model examining the relationship between BPN frustration and procrastination, prior to adding the mediators to the model ($p < .001***$).

Figure 4.*Mediation Model with BPN Frustration*

Note. Structural mediation model. Solid lines represent statistically significant relationships ($p < .001^{***}$, $p < .01^{**}$, $p < .05^{*}$). Dotted lines indicate non-significant relationships.

Figure 5 depicts the results from the structural mediation model with BPN frustration, autonomous motivation, controlled motivation, and amotivation, including their hypothesized paths and corresponding standardized estimates. The proposed model was below the threshold of acceptable fit: $\chi^2(197) = 4.62$, $p \leq .01$, CFI = .93, TLI = .92, RMSEA = .078, and SRMR = .13. Standardized factor loadings are presented in Table 4. All factor loadings of latent variables were within an acceptable range (Ertz et al., 2016).

This model showed that BPN frustration was significantly and negatively associated with autonomous motivation ($\beta = -.34$, $p \leq .01$) and positively associated with amotivation ($\beta = .56$, $p \leq .001$). BPN frustration was not significantly associated with controlled motivation ($\beta = .02$, $p = .63$). Autonomous motivation was negatively associated with procrastination ($\beta = -.18$, $p \leq .01$),

whereas controlled motivation ($\beta = -.05, p = .27$) and amotivation ($\beta = .02, p = .69$) were not significantly associated with procrastination.

The standardized direct path from BPN frustration to procrastination was statistically significant after the mediators were included in the model ($\beta = .43, p = .01$). The standardized indirect path of BPN frustration to procrastination was marginally statistically significant ($\beta = .07, p = .51$), indicating that autonomous and controlled motivation, and amotivation—altogether—do not play a significant role in the relationship between BPN frustration and procrastination. A Sobel test was conducted to examine the indirect tests individually. This revealed that autonomous motivation was a significant mediator between BPN frustration and procrastination ($z = 3.45, p \leq .001$). In total, the variables in this path model accounted for 28% of the variance in procrastination.

Table 4.

Latent factor loadings for BPN Frustration Mediation Model

Parcel	Factor Loading
BPN FRUS	
1	.82
2	.78
3	.87
Autonomous Motivation	
1	.80
2	.89
3	.90
4	.87
Controlled Motivation	
1	.67
2	.75
3	.87
4	.87
Amotivation	
1	.85
2	.79

3	.82
4	.82
Procrastination	
1	.70
2	.76
3	.76

Note. BPN FRUS = Basic psychological need frustration.

Discussion

The current study's overarching goal was to support and extend previous research by examining the relationship between BPN satisfaction and frustration, academic motivation, and procrastination. The current study's results provided further evidence of significant relationships between BPN satisfaction and academic motivation, and academic motivation and procrastination. However, we did find novel results regarding the mediational role of academic motivation between BPN satisfaction and procrastination. Furthermore, the significance of relationships between BPN frustration, academic motivation, and procrastination is a new addition to both SDT and procrastination literature.

In the current study, BPN satisfaction significantly—either positively or negatively—predicted all three types of academic motivation. BPN satisfaction was positively associated with autonomous motivation, meaning that students who perceived their needs as satisfied were more likely to endorse autonomous motivations. The relationship between need satisfaction and autonomous motivation is a well-established finding in SDT research in a variety of different contexts (Frielink et al., 2018; Haerens et al., 2015; Klaijsen et al., 2017; Milyavaskaya & Koestener, 2011; Vansteenkiste et al., 2004; Zhang et al., 2011). BPN satisfaction was negatively associated with amotivation, meaning that students who perceived their needs as less satisfied were more likely to lack motivation entirely.

Contrary to previous studies that have found negative relationships between BPN satisfaction and controlled motivation (Frielink et al., 2018), our results suggested that need satisfaction positively predicted controlled motivation. This may be because autonomous and controlled forms of motivation are often simultaneously endorsed by approximately 50% of students (Ratelle et al., 2007). Furthermore, autonomous and controlled motivations can be combined in four different ways (i.e., high-high, high-low, low-high, and low-low; Ratelle et al., 2007; Vansteenkiste et al., 2009). Our sample may have included a significant number of students who would be categorized as high autonomous and high controlled. This would explain why BPN satisfaction was positively associated with autonomous and controlled motivation. Nevertheless, our results support SDT's assertions that BPN satisfaction is an antecedent to high-quality motivation (e.g., autonomous motivation), and that low BPN satisfaction is related to amotivation (Krijgsman et al., 2017; Li et al., 2013; Milyayskaya & Koestner, 2011; Ryan & Deci, 2000).

Our results also suggested that both autonomous motivation and amotivation significantly predicted procrastination. It is well-established in previous literature that academic motivation—when measured as a composite—is a significant predictor of procrastination (Sirin, 2011; Burnham et al., 2014). Furthermore, research has found that lower intrinsic motivation and amotivation are consistently related to higher procrastination in various educational contexts (Burnham et al., 2014; Dunn, 2014; Klassen, Krawchuk, & Rajani, 2008; Rakes & Dunn, 2010). In the current study, autonomous motivation was negatively associated with procrastination, whereas amotivation was positively associated with procrastination. Although we predicted that controlled motivation would be positively associated with procrastination, we did not find this association. However, some studies have found similar results where controlled motivation was

not significantly associated with procrastination or, to a lesser extent than amotivation or autonomous motivation (Cerino, 2014; Chu & Choi, 2005; Lee, 2005).

Unlike BPN satisfaction, BPN frustration only significantly predicted autonomous academic motivation and amotivation. BPN frustration was negatively associated with autonomous motivation, meaning that students who perceived their needs as frustrated were less likely to endorse autonomous motivations. BPN frustration was positively associated with amotivation, meaning that students who perceived their needs as frustrated were more likely to lack motivation. We did not find a significant association between BPN frustration and controlled motivation. Although the relationship between BPN frustration and controlled motivation has been found in previous research (Haerens et al., 2015), a study by Krijgsman et al. (2017) found that need frustration did not significantly predict introjected regulation.

Regarding the relationship between academic motivation and procrastination, autonomous motivation significantly and negatively predicted procrastination in the need frustration model. Need frustration is related to lessened self-control and would likely lead to decreases in autonomous motivations and subsequent increases in procrastination behaviours (Vansteenkiste & Ryan, 2013). Neither amotivation nor controlled motivation significantly predicted procrastination in the context of BPN frustration. Theoretically, however, amotivation should predict procrastination and, thus, this result may be due to the variance being shared in this model among the variables.

Finally, our results suggested that BPN satisfaction and frustration are both direct and indirect predictors of procrastination. Although previous research has found that BPN satisfaction is significantly associated with procrastination (Cavusoglu & Karatas, 2015; Codina et al., 2018), this is the first study that has examined whether BPN frustration was associated

with procrastination. When examining the direct effect of BPN, we found that satisfaction significantly and negatively predicted procrastination, meaning that students who perceived their needs as satisfied were less likely to engage in procrastination. Furthermore, we found that frustration significantly and positively predicted procrastination, meaning that students who perceived their needs as frustrated were more likely to engage in procrastination. By examining procrastination through the lens of SDT, we shifted the focus from the individual to the learning environment created by the post-secondary institution.

Other SDT researchers have tested whether motivation is a mediator in the relationship between BPN and a variety of outcomes, such as well-being and positive and negative affect (Katz et al., 2014; Malkoc & Mutlu, 2018; McDonough & Crocker, 2007; Milyavskaya & Koestner, 2011; Ntoumanis, 2005). However, our study is the first to examine whether academic motivation is a mediator in the relationship between BPN satisfaction and frustration, and procrastination. Like the results of the previous studies that examine motivation, we found that academic motivation partially mediated the relationship between BPN satisfaction and procrastination. This is likely due to multiple mechanisms by which BPN satisfaction can lead to or reduce procrastination. For example, BPN satisfaction may increase an individual's ability to self-regulate, which could increase their academic motivation and reduce their procrastination (Maryam & Mohtaram, 2019). Conversely, academic motivation was not a mediator in the relationship between BPN frustration and procrastination. However, when each type of motivation was examined individually, autonomous motivation was a significant mediator in this relationship. The statistical significance of autonomous motivation, which pulled variance away from the other variables, may explain this. As previously mentioned, this model had poorer fit and, thus, results should be interpreted with caution.

The strength of the relationship between BPN satisfaction and frustration and procrastination, compared to the relationship between academic motivation variables and procrastination, suggests that BPN satisfaction and frustration may contribute more significantly to procrastination. Rather than academic procrastination being a person-centred issue, it may be more related to the environment in which students find themselves procrastinating. According to our models, changing motivation may still lead to procrastination if students experience a lack of need satisfaction or need frustration. Thus, it may be more important for the university to focus on how they can provide an autonomy-supportive environment.

Implications for Post-Secondary Institutions

As the number of individuals attending post-secondary institutions rises and the demographic profiles of students diversify, post-secondary institutions face the increasingly difficult challenge of meeting the needs of all of their students (Levesque-Bristol et al., 2019). Furthermore, student rates of procrastination are staggeringly high across campuses, which can have significant, negative impacts on their academic success (Kim & Seo, 2015). This study's results can have important implications for strategies used in interventions to target procrastination in the classroom and the post-secondary environment as a whole.

Given the prevalence of students citing procrastination as a significant problem in their academic lives, the implementation of procrastination interventions across post-secondary institutions may be a cost-effective approach. Despite the significant need, research concerning interventions remains scarce (Zacks & Hen, 2018). The recent intervention studies have typically employed various cognitive and behavioural strategies such as time management, acceptance and commitment therapy, and cognitive behavioural therapy to address procrastination. However, a recent meta-analysis study suggested that future intervention studies should utilize self-

determination theory, as BPN may be implicated in enhancing students' initiative (Van Eerde & Klingsieck, 2018). Our results showed a significant relationship between BPN satisfaction and procrastination, supporting the notion that targeting students' BPN in an intervention could potentially increase their autonomous motivation and, subsequently, decrease their procrastination.

Many post-secondary institutions are beginning to provide students with autonomy-supportive learning environments. Autonomy-supportive learning environments provide students with choices and options in the classroom and opportunities to regularly demonstrate their skills and interact with the professor in a meaningful and reciprocal way (Levesque-Bristol et al., 2019). Strategies for creating an autonomy-supportive learning environment include providing constructive, positive feedback, allowing students to choose their assignments' weighting, and being more approachable and relatable (Jang et al., 2016; Reeve, 2009). Purdue University has recently implemented the IMPACT program, a comprehensive multi-year campus-wide collaborative effort to achieve greater student-centred learning environments. It incorporates active and collaborative learning by fostering student engagement, competence, autonomy, and relatedness (Levesque-Bristol et al., 2019). The IMPACT initiative results have suggested the utility in supporting the BPN to increase student success and retention. The implementation of initiatives—such as IMPACT—across campuses internationally may allow for the targeting of procrastination on a large scale.

Limitations

Despite some novel results, there are several limitations associated with the results of this study. First, our models with BPN frustration did not have adequate fit and, thus, the results must be interpreted cautiously. Future studies should aim to re-test models with BPN frustration to

obtain a model with adequate fit to ensure accurate results. Second, this study utilized a cross-sectional design due to limited time and resources. Future research should aim to measure these variables longitudinally. Longitudinal designs allow for more accurate causal interpretations of the results and a deeper understanding of the degree and direction of change over time between the variables (Caruana et al., 2015). Third, this study relied upon self-report measures. Students may have been less inclined to report their procrastination behaviours accurately to represent themselves more positively. Both social desirability and single-source bias may have led to masked or spurious associations among the variables. Future research could include professors and their perception of student need satisfaction and need frustration for a more in-depth examination of others' roles in these relationships. Finally, this study did not measure or control for other variables that may play a role in the relationship between BPN satisfaction and frustration, academic motivation, and procrastination. Future research should aim to examine multiple mechanisms (e.g., students' perception of teaching style) and potentially compare models to determine which variables play the greatest role in this relationship.

Conclusion

This study was the first to examine the relationship between BPN satisfaction and frustration, academic motivation, and procrastination. Our results demonstrated the impact of BPN on both academic motivation and procrastination, and the mediating role of academic motivation in these relationships. The results have important implications for how post-secondary institutions structure their courses and how professors interact with their students. We must adapt and ensure we provide students with an autonomy-supportive learning environment to address the complexity of student needs and increase their academic success.

References

- Aremu, A. O., Williams, T. M., & Adesina, F. (2011). Influence of procrastination and personality types on academic achievement and efficacy of in-school adolescents in Ibadan. *IFE Psychologia: An International Journal*, 19(1), 93-113. <https://hdl.handle.net/10520/EJC38859>
- Baker, S. R. (2004). Intrinsic, extrinsic, and amotivational orientations: Their role in university adjustment, stress, well-being, and subsequent academic performance. *Current Psychology*, 23(3), 189-202. <https://doi.org/10.1007/s12144-004-1019-9>
- Bartholomew, K. J., Ntoumanis, N., Ryan, R. M., Bosch, J. A., & Thøgersen-Ntoumani, C. (2011). Self-determination theory and diminished functioning: The role of interpersonal

- control and psychological need thwarting. *Personality and Social Psychology Bulletin*, 37(11), 1459-1473. <https://doi.org/10.1177/0146167211413125>
- Bentler, P. M. (1992). On the fit of models to covariances and methodology to the *Bulletin. Psychological Bulletin*, 112(3), 400–404. <https://doi.org/10.1037/0033-2909.112.3.400>
- Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin*, 107(2), 238–246. <https://doi.org/10.1037/0033-2909.107.2.238>
- Boggiano, A. K., & Ruble, D. N. (1979). Competence and the overjustification effect: A developmental study. *Journal of Personality and Social Psychology*, 37(9), 1462. <https://doi.org/10.1037/0022-3514.37.9.1462>
- Burka, J. B., & Yuen, L. M. (2008). *Procrastination: Why You Do It, What to Do about It Now*. Da Capo Press.
- Burnam, A., Komarraju, M., Hamel, R., & Nadler, D. R. (2014). Do adaptive perfectionism and self-determined motivation reduce procrastination? *Learning and Individual Differences*, 36, 165–172. <https://doi.org/10.1016/j.lindif.2014.10.009>
- Byrne, B. M. (2001). *Multivariate applications book series. Structural equation modeling with AMOS: Basic concepts, applications, and programming*. Lawrence Erlbaum Associates Publishers.
- Carter, R. L. (2006). Solutions for Missing Data in Structural Equation Modeling. *Research & Practice in Assessment*, 1(1), 4-7. <https://files.eric.ed.gov/fulltext/EJ1062693.pdf>

Caruana, E. J., Roman, M., Hernández-Sánchez, J., & Solli, P. (2015). Longitudinal studies.

Journal of thoracic disease, 7(11), 537-540. <https://doi.org/10.3978/j.issn.2072-1439.2015.10.63>

Cavusoglu, C., & Karatas, H. (2015). Procrastination of undergraduates: Self-determination theory and academic motivation. *The Anthropologist*, 20(3), 735-743.

<https://doi.org/10.1080/09720073.2015.11891780>

Cerino, E. S. (2014). Relationships Between Academic Motivation, Self-Efficacy, and Academic Procrastination. *Psi Chi Journal of Psychological Research*, 19(4). 10.24839/2164-

8204.JN19.4.156

Chen, B., Vansteenkiste, M., Beyers, W., Boone, L., Deci, E. L., Van der Kaap-Deeder, J.,

Duriez, B., Lens, W., Matos, L., Mouratidis, T., Ryan, R. M., Sheldon, K., Soenens, B.,

Van Petegem, S., & Verstuyf, J. (2015). BPN satisfaction, need frustration, and need

strength across four cultures. *Motivation and Emotion*, 39(2), 216- 236. [10.1007/s11031-](https://doi.org/10.1007/s11031-014-9450-1)

[014-9450-1](https://doi.org/10.1007/s11031-014-9450-1)

Chu, A. H. C., & Choi, J. N. (2005). Rethinking procrastination: Positive effects of "active"

procrastination behavior on attitudes and performance. *The Journal of Social Psychology*,

145(3), 245-264. <https://doi.org/10.3200/SOCP.145.3.245-264>

Codina, N., Valenzuela, R., Pestana, J. V., & Gonzalez-Conde, J. (2018). Relations between

student procrastination and teaching styles: autonomy-supportive and

controlling. *Frontiers in Psychology*, 9, 809. [10.3389/fpsyg.2018.00809](https://doi.org/10.3389/fpsyg.2018.00809)

Connell, J. P., & Wellborn, J. G. (1991). Competence, autonomy, and relatedness: A

motivational analysis of self-system processes. In M. R. Gunnar & L. A. Sroufe

- (Eds.), *The Minnesota symposia on child psychology, Vol. 23. Self processes and development* (pp. 43–77). Lawrence Erlbaum Associates, Inc.
- Cordeiro, P., Paixão, P., Lens, W., Lacante, M., & Luyckx, K. (2016). The Portuguese validation of the BPN Satisfaction and Frustration Scale: Concurrent and longitudinal relations to well-being and ill-being. *Psychologica Belgica*, 56(3), 193–209. <https://doi.org/10.5334/pb.252>
- Deci, E. L., & Ryan, R. M. (2008). Self-determination theory: A macrotheory of human motivation, development, and health. *Canadian psychology/Psychologie canadienne*, 49(3), 182. <https://doi.org/10.1037/a0012801>
- Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological inquiry*, 11(4), 227-268. https://doi.org/10.1207/S15327965PLI1104_01
- Deci, E., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. Springer Science & Business Media.
- Deci, E. L. (1976). Notes on the theory and metatheory of intrinsic motivation. *Organizational behavior and human performance*, 15(1), 130-145. [10.1016/0030-5073\(76\)90033-7](https://doi.org/10.1016/0030-5073(76)90033-7)
- Deci, E. L., Ryan, R. M., Gagné, M., Leone, D. R., Usunov, J., & Kornazheva, B. P. (2001). Need satisfaction, motivation, and well-being in the work organizations of a former eastern bloc country: A cross-cultural study of self-determination. *Personality and social psychology bulletin*, 27(8), 930-942. <https://doi.org/10.1177/0146167201278002>

- Dunn, K. (2014). Why wait? The influence of academic self-regulation, intrinsic motivation, and statistics anxiety on procrastination in online statistics. *Innovative Higher Education*, 39(1), 33-44. <https://doi.org/10.1007/s10755-013-9256-1>
- Ertz, M., Karakas, F., & Sarigöllü, E. (2016). Exploring pro-environmental behaviors of consumers: An analysis of contextual factors, attitude, and behaviors. *Journal of Business Research*, 69(10), 3971-3980. doi:10.1016/j.jbusres.2016.06.010
- Fairchild, A. J., Horst, S. J., Finney, S. J., & Barron, K. E. (2005). Evaluating existing and new validity evidence for the Academic Motivation Scale. *Contemporary Educational Psychology*, 30(3), 331-358. doi:10.1016/j.cedpsych.2004.11.001
- Faye, C., & Sharpe, D. (2008). Academic motivation in university: The role of basic psychological needs and identity formation. *Canadian Journal of Behavioural Science/Revue canadienne des sciences du comportement*, 40(4), 189. <https://doi.org/10.1037/a0012858>
- Fortier, M. S., Vallerand, R. J., & Guay, F. (1995). Academic motivation and school performance: Toward a structural model. *Contemporary educational psychology*, 20(3), 257-274. <https://lrcs.uqam.ca/wp-content/uploads/2017/04/Academic-motivation-and-school-performance.pdf>
- Frielink, N., Schuengel, C., & Embregts, P. J. (2018). Autonomy support, need satisfaction, and motivation for support among adults with intellectual disability: Testing a self-determination theory model. *American Journal on Intellectual and Developmental Disabilities*, 123(1), 33-49. <https://doi.org/10.1352/1944-7558-123.1.33>

- Grolnick, W. S., & Ryan, R. M. (1987). Autonomy in children's learning: An experimental and individual difference investigation. *Journal of personality and social psychology*, 52(5), 890. <https://doi.org/10.1037/0022-3514.52.5.890>
- Grund, A., & Fries, S. (2018). Understanding procrastination: A motivational approach. *Personality and Individual Differences*, 121, 120-130. <https://doi.org/10.1016/j.paid.2017.09.035>
- Grunschel, C., Patrzek, J., & Fries, S. (2013). Exploring reasons and consequences of academic procrastination: An interview study. *European Journal of Psychology of Education*, 28(3), 841-861. <https://doi.org/10.1007/s10212-012-0143-4>
- Haerens, L., Aelterman, N., Vansteenkiste, M., Soenens, B., & Van Petegem, S. (2015). Do perceived autonomy-supportive and controlling teaching relate to physical education students' motivational experiences through unique pathways? Distinguishing between the bright and dark side of motivation. *Psychology of Sport and Exercise*, 16(Part 3), 26–36. <https://doi.org/10.1016/j.psychsport.2014.08.013>
- Harriott, J., & Ferrari, J. R. (1996). Prevalence of procrastination among samples of adults. *Psychological reports*, 78(2), 611-616. <https://doi.org/10.2466/pr0.1996.78.2.611>
- Hu, L.-t., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, 6(1), 1–55. <https://doi.org/10.1080/10705519909540118>
- Hussain, I., & Sultan, S. (2010). Analysis of procrastination among university students. *Procedia-Social and Behavioral Sciences*, 5, 1897-1904. <https://doi.org/10.1016/j.sbspro.2010.07.385>

Iacobucci, D. (2010). Structural equations modeling: Fit indices, sample size, and advanced topics. *Journal of Consumer Psychology*, 20(1), 90-98.

<https://doi.org/10.1016/j.jcps.2009.09.003>

Jang, H., Reeve, J., & Halusic, M. (2016). A new autonomy-supportive way of teaching that increases conceptual learning: Teaching in students' preferred ways. *The Journal of Experimental Education*, 84(4), 686-701.

<https://doi.org/10.1080/00220973.2015.1083522>

Katz, B., Jaeggi, S., Buschkuhl, M., Stegman, A., & Shah, P. (2014). Differential effect of motivational features on training improvements in school-based cognitive training. *Frontiers in human neuroscience*, 8, 242.

<https://doi.org/10.3389/fnhum.2014.00242>

Katz, I., Eilott, K., & Nevo, N. (2014). “I’ll do it later”: Type of motivation, self-efficacy and homework procrastination. *Motivation and Emotion*, 38(1), 111–119.

<https://doi.org/10.1007/s11031-013-9366-1>

Kelly, A. C., Zuroff, D. C., Leybman, M. J., Martin, E. A., & Koestner, R. (2008). Satisfied groups and satisfied members: Untangling the between-and within-groups effects of need satisfaction. *Journal of Applied Social Psychology*, 38(7), 1805-1826.

<https://doi.org/10.1111/j.1559-1816.2008.00370.x>

Kim, K. R., & Seo, E. H. (2015). The relationship between procrastination and academic performance: A meta-analysis. *Personality and Individual Differences*, 82, 26-33.

<https://doi.org/10.1016/j.paid.2015.02.038>

- Klaeijssen, A., Vermeulen, M., & Martens, R. (2018). Teachers' innovative behaviour: The importance of BPN satisfaction, intrinsic motivation, and occupational self-efficacy. *Scandinavian Journal of Educational Research*, 62(5), 769–782. <https://doi.org/10.1080/00313831.2017.1306803>
- Klassen, R. M., Krawchuk, L. L., & Rajani, S. (2008). Procrastination of undergraduates: Low self-efficacy to self-regulate predicts higher levels of procrastination. *Contemporary Educational Psychology*, 33(4), 915–931. <https://doi.org/10.1016/j.cedpsych.2007.07.001>
- Kline, R. B. (2016). *Methodology in the social sciences. Principles and practice of structural equation modeling (4th ed.)*. Guilford Press.
- Klingsieck, K. B., Grund, A., Schmid, S., & Fries, S. (2013). Why students procrastinate: A qualitative approach. *Journal of College Student Development*, 54(4), 397-412. [10.1353/csd.2013.0060](https://doi.org/10.1353/csd.2013.0060)
- Koestner, R., Ryan, R. M., Bernieri, F., & Holt, K. (1984). Setting limits on children's behavior: The differential effects of controlling vs. informational styles on intrinsic motivation and creativity. *Journal of personality*, 52(3), 233-248. [10.1111/j.1467-6494.1984.tb00879.x](https://doi.org/10.1111/j.1467-6494.1984.tb00879.x)
- Krijgsman, C., Vansteenkiste, M., van Tartwijk, J., Maes, J., Borghouts, L., Cardon, G., Mainhard, T., & Haerens, L. (2017). Performance grading and motivational functioning and fear in physical education: A self-determination theory perspective. *Learning and Individual Differences*, 55, 202-211. <https://doi.org/10.1016/j.lindif.2017.03.017>

Lay, C. H., & Schouwenburg, H. C. (1993). Trait Procrastination, Time Management. *Journal of social Behavior and personality*, 8(4), 647-662.

<https://search.proquest.com/docview/1292262496?pq-origsite=gscholar&imgSeq=1>

Lee, E. (2005). The relationship of motivation and flow experience to procrastination in university students. *The Journal of Genetic Psychology*, 166(1), 5-15.

<https://doi.org/10.3200/GNTP.166.1.5-15>

Legault, L., Green-Demers, I., & Pelletier, L. (2006). Why do high school students lack motivation in the classroom? Toward an understanding of academic amotivation and the role of social support. *Journal of Educational Psychology*, 98(3), 567.

<https://doi.org/10.1037/0022-0663.98.3.567>

León, J., & Núñez, J. L. (2013). Causal ordering of BPN and well-being. *Social Indicators Research*, 114(2), 243-253. [10.1007/s11205-012-0143-4](https://doi.org/10.1007/s11205-012-0143-4)

Levesque-Bristol, C., Maybee, C., Parker, L. C., Zywicki, C., Connor, C., & Flierl, M. (2019). Shifting culture: Professional development through academic course transformation. *Change: The Magazine of Higher Learning*, 51(1), 35-41.

<https://doi.org/10.1080/00091383.2019.1547077>

Levesque, C., Zuehlke, A. N., Stanek, L. R., & Ryan, R. M. (2004). Autonomy and competence in German and American university students: A comparative study based on self-determination theory. *Journal of Educational Psychology*, 96(1), 68.

<https://doi.org/10.1037/0022-0663.96.1.68>

Li, C., Wang, C. J., Pyun, D. Y., & Kee, Y. H. (2013). Burnout and its relations with basic psychological needs and motivation among athletes: A systematic review and meta-

analysis. *Psychology of Sport and Exercise*, 14(5), 692-700.

<https://doi.org/10.1016/j.psychsport.2013.04.009>

Liu, J., Bartholomew, K., & Chung, P. K. (2017). Perceptions of teachers' interpersonal styles and well-being and ill-being in secondary school physical education students: The role of need satisfaction and need frustration. *School Mental Health*, 9(4), 360-371.

https://ueaeprints.uea.ac.uk/id/eprint/64400/1/Accepted_manuscript.pdf

Malkoç, A., & Mutlu, A. K. (2018). Academic self-efficacy and procrastination: Exploring the mediating role of academic motivation in Turkish university students. *Universal Journal of Educational Research*, 6(10), 2087-2093. [10.13189/ujer.2018.061005](https://doi.org/10.13189/ujer.2018.061005)

Maryam, N., & Mohtaram, N. (2019). The mediating role of self-esteem and self-regulation in relation of BPN and psychological well-being. *Psychological Studies*, 15(2), 145-163.

[10.22051/PSY.2019.24941.1853](https://doi.org/10.22051/PSY.2019.24941.1853)

McDonough, M. H., & Crocker, P. R. (2007). Testing self-determined motivation as a mediator of the relationship between psychological needs and affective and behavioral outcomes. *Journal of Sport and exercise Psychology*, 29(5), 645-663.

[10.1123/jsep.29.5.645](https://doi.org/10.1123/jsep.29.5.645)

Miles, J., & Shevlin, M. (2001). *Applying regression and correlation: A guide for students and researchers*. Sage.

Milyavskaya, M., & Koestner, R. (2011). Psychological needs, motivation, and well-being: A test of self-determination theory across multiple domains. *Personality and Individual Differences*, 50(3), 387-391. <https://doi.org/10.1016/j.paid.2010.10.029>

- Mouratidis, A., Michou, A., & Vassiou, A. (2017). Adolescents' autonomous functioning and implicit theories of ability as predictors of their school achievement and week-to-week study regulation and well-being. *Contemporary Educational Psychology*, 48, 56-66.
<https://doi.org/10.1016/j.cedpsych.2016.09.001>
- Niemiec, C. P., & Ryan, R. M. (2009). Autonomy, competence, and relatedness in the classroom: Applying self-determination theory to educational practice. *School Field*, 7(2), 133-144.
[10.1177/1477878509104318](https://doi.org/10.1177/1477878509104318)
- Ntoumanis, N. (2005). A prospective study of participation in optional school physical education using a self-determination theory framework. *Journal of Educational Psychology*, 97(3), 444-453. <https://doi.org/10.1037/0022-0663.97.3.444>
- O'Brien, W. K. (2002). Applying the transtheoretical model to academic procrastination. *The Sciences and Engineering*, 62(11-B), 5359. <https://psycnet.apa.org/record/200295010-384>
- Oram, R., Rogers, M., & DuPaul, G. (2020). Explaining the relationship between ADHD symptomatology and amotivation in the undergraduate population: The Role of Basic Psychological Need Frustration. *Canadian Journal of School Psychology*, 35(2), 139-153. <https://doi.org/10.1177/0829573519880063>
- Patrick, H., & Williams, G. C. (2012). Self-determination theory: its application to health behavior and complementarity with motivational interviewing. *International Journal of behavioral nutrition and physical Activity*, 9(1), 18. <https://doi.org/10.1186/1479-5868-9-18>

Pychyl, T. A., Lee, J. M., Thibodeau, R., & Blunt, A. (2000). Five days of emotion: An experience sampling study of undergraduate student procrastination. *Journal of social Behavior and personality*, 15(5), 239.

<https://search.proquest.com/docview/1292314750?accountid=14701>

Rakes, G. C., & Dunn, K. E. (2010). The Impact of Online Graduate Students' Motivation and Self-Regulation on Procrastination. *Journal of Interactive Online Learning*, 9(1), 78-93.

<https://www.learntechlib.org/p/109409/>

Ratelle, C. F., Guay, F., Vallerand, R. J., Larose, S., & Senécal, C. (2007). Autonomous, controlled, and amotivated types of academic motivation: A person-oriented analysis. *Journal of educational psychology*, 99(4), 734. <https://doi.org/10.1037/0022-0663.99.4.734>

Reeve, J. (2009). Why teachers adopt a controlling motivating style toward students and how they can become more autonomy supportive. *Educational psychologist*, 44(3), 159-175.

<https://doi.org/10.1080/00461520903028990>

Rothblum, E. D., Solomon, L. J., & Murakami, J. (1986). Affective, cognitive, and behavioral differences between high and low procrastinators. *Journal of counseling psychology*, 33(4), 387. <https://doi.org/10.1037/0022-0167.33.4.387>

Rouse, P. C., Turner, P. J., Siddall, A. G., Schmid, J., Standage, M., & Bilzon, J. L. (2019). The interplay between psychological need satisfaction and psychological need frustration within a work context: A variable and person-oriented approach. *Motivation and Emotion*, 1-15. <https://doi.org/10.1007/s11031-019-09816-3>

- Ryan, R. M., & Deci, E. L. (2006). Self-regulation and the problem of human autonomy: does psychology need choice, self-determination, and will?. *Journal of personality*, 74(6), 1557-1586. [10.1111/j.1467-6494.2006.00420.x](https://doi.org/10.1111/j.1467-6494.2006.00420.x)
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American psychologist*, 55(1), 68. 10.1037/110003-066X.55.1.68
- Schultz, P. P., Ryan, R. M., Niemiec, C. P., Legate, N., & Williams, G. C. (2015). Mindfulness, work climate, and psychological need satisfaction in employee well-being. *Mindfulness*, 6(5), 971–985. <https://doi.org/10.1007/s12671-014-0338-7>
- Schouwenburg, H. C., Lay, C. H., Pychyl, T. A., & Ferrari, J. R. (2004). *Counseling the procrastinator in academic settings*. American Psychological Association.
- Schraw, G., Wadkins, T., & Olafson, L. (2007). Doing the things we do: A grounded theory of procrastination. *Journal of Educational psychology*, 99(1), 12. <https://doi.org/10.1037/0022-0663.99.1.12>
- Senecal, C., Koestner, R., & Vallerand, R. J. (1995). Self-regulation and academic procrastination. *The journal of social psychology*, 135(5), 607-619. <https://doi.org/10.1080/00224545.1995.9712234>
- Shahar, G., Henrich, C. C., Blatt, S. J., Ryan, R., & Little, T. D. (2003). Interpersonal relatedness, self-definition, and their motivational orientation during adolescence: A theoretical and empirical integration. *Developmental psychology*, 39(3), 470. [10.1037/0012-1649.39.3.470](https://doi.org/10.1037/0012-1649.39.3.470)

Sirin, E. F. (2011). Procrastination among undergraduates attending school of physical education and sports: Role of general procrastination, academic motivation and academic self-efficacy. *Educational Research and Reviews*, 6(5), 447.

<https://www.semanticscholar.org/paper/Academic-Procrastination-among-Undergraduates-of-of-%C5%9Eirin/70c60ca026582b79fa98379998e9f2ae830de3d6>

Solomon, L. J., & Rothblum, E. D. (1984). Procrastination: Frequency and cognitive-behavioral correlates. *Journal of Counseling Psychology*, 31(4), 503–509.

<https://doi.org/10.1037/0022-0167.31.4.503>

Stead, R., Shanahan, M. J., & Neufeld, R. W. (2010). “I’ll go to therapy, eventually”: Procrastination, stress and mental health. *Personality and Individual Differences*, 49(3), 175-180. [https://www.psychologytoday.com/files/attachments/41207/ill-go-therapy-](https://www.psychologytoday.com/files/attachments/41207/ill-go-therapy-eventually-stead-shanahan-neufeld-2010.pdf)

[eventually-stead-shanahan-neufeld-2010.pdf](https://www.psychologytoday.com/files/attachments/41207/ill-go-therapy-eventually-stead-shanahan-neufeld-2010.pdf)

Steel, P., & Klingsieck, K. B. (2016). Procrastination: Psychological antecedents revisited. *Australian Psychologist*, 51(1), 36-46. <https://doi.org/10.1111/ap.12173>

Steel, P. (2007). The nature of procrastination: A meta-analytic and theoretical review of quintessential self-regulatory failure. *Psychological bulletin*, 133(1), 65.

<https://doi.org/10.1037/0033-2909.133.1.65>

Tice, D. M., & Baumeister, R. F. (1997). Longitudinal study of procrastination, performance, stress, and health: The costs and benefits of dawdling. *Psychological science*, 8(6), 454-458. <https://doi.org/10.1111/j.1467-9280.1997.tb00460.x>

Trenshaw, K. F., Revelo, R. A., Earl, K. A., & Herman, G. L. (2016). Using self-determination theory principles to promote engineering students’ intrinsic motivation to

learn. *International Journal of Engineering Education*, 32(3), 1194-207.

[http://selfdeterminationtheory.org/wp-](http://selfdeterminationtheory.org/wp-content/uploads/2017/05/2016_Trenshaw_etal_IJEE.pdf)

[content/uploads/2017/05/2016_Trenshaw_etal_IJEE.pdf](http://selfdeterminationtheory.org/wp-content/uploads/2017/05/2016_Trenshaw_etal_IJEE.pdf)

Tuckman, B. W., & Sexton, T. L. (1992). Self-believers are self-motivated; self-doubters are not. *Personality and Individual Differences*, 13(4), 425-428.

[https://doi.org/10.1016/0191-8869\(92\)90070-6](https://doi.org/10.1016/0191-8869(92)90070-6)

Unanue, W., Dittmar, H., Vignoles, V. L., & Vansteenkiste, M. (2014). Materialism and well-being in the UK and Chile: Basic need satisfaction and basic need frustration as underlying psychological processes. *European Journal of Personality*, 28(6), 569-585.

<https://doi.org/10.1002/per.1954>

Vallerand, R. J., Pelletier, L. G., Blais, M. R., Brière, N. M., Senecal, C., & Vallieres, E. F. (1993). On the assessment of intrinsic, extrinsic, and amotivation in education: Evidence on the concurrent and construct validity of the Academic Motivation Scale. *Educational and psychological measurement*, 53(1), 159-172. [10.1177/0013164493053001018](https://doi.org/10.1177/0013164493053001018)

Vallerand, R. J., Pelletier, L. G., Blais, M. R., Briere, N. M., Senecal, C., & Vallieres, E. F. (1992). The Academic Motivation Scale: A measure of intrinsic, extrinsic, and amotivation in education. *Educational and Psychological Measurement*, 52(4), 1003-1017. <https://doi.org/10.1177/0013164492052004025>

van Eerde, W., & Klingsieck, K. B. (2018). Overcoming procrastination? A meta-analysis of intervention studies. *Educational Research Review*, 25, 73-85.

<https://doi.org/10.1016/j.edurev.2018.09.002>

- Vansteenkiste, M., Lens, W., & Deci, E. L. (2006). Intrinsic versus extrinsic goal contents in self-determination theory: Another look at the quality of academic motivation. *Educational psychologist*, 41(1), 19-31.
https://doi.org/10.1207/s15326985ep4101_4
- Vansteenkiste, M., Lens, W., De Witte, S., De Witte, H., & Deci, E. L. (2004). The ‘why’ and ‘why not’ of job search behaviour: their relation to searching, unemployment experience, and well-being. *European journal of social psychology*, 34(3), 345-363.
10.1002/ejsp.202
- Vansteenkiste, M., Lens, W., Soenens, B., & Luyckx, K. (2006). Autonomy and relatedness among Chinese sojourners and applicants: Conflictual or independent predictors of well-being and adjustment?. *Motivation and Emotion*, 30(4), 273-282.
<https://doi.org/10.1007/s11031-006-9041-x>
- Vansteenkiste, M., & Ryan, R. M. (2013). On psychological growth and vulnerability: Basic psychological need satisfaction and need frustration as a unifying principle. *Journal of Psychotherapy Integration*, 23(3), 263. <https://doi.org/10.1037/a0032359>
- Vansteenkiste, M., & Sheldon, K. M. (2006). There's nothing more practical than a good theory: Integrating motivational interviewing and self-determination theory. *British journal of clinical psychology*, 45(1), 63-82. [10.1348/014466505X34192](https://doi.org/10.1348/014466505X34192)
- Vansteenkiste, M., Sierens, E., Soenens, B., Luyckx, K., & Lens, W. (2009). Motivational profiles from a self-determination perspective: The quality of motivation matters. *Journal of Educational Psychology*, 101(3), 671–688. <https://doi.org/10.1037/a0015083>

Vij, J., & Lomash, H. (2014). Role of motivation in procrastination. *International Journal of Scientific & Engineering Research*, 5(8), 1065-1070.

<https://www.semanticscholar.org/paper/Role-of-Motivation-in-Academic-Procrastination-Vij-Lomash/732078d61a4572953cbd4f6739d52e9d6d8f574f>

Weman-Josefsson, K., Lindwall, M., & Ivarsson, A. (2015). Need satisfaction, motivational regulations and exercise: moderation and mediation effects. *International Journal of Behavioral Nutrition and Physical Activity*, 12(1), 67. <https://doi.org/10.1186/s12966-015-0226-0>

Williams, J. G., Stark, S. K., & Foster, E. E. (2008). Start today or the very last day? The relationships among self-compassion, motivation, and procrastination. *American journal of psychological research*, 4, 37-44. <https://self-compassion.org/wp-content/uploads/publications/scmotivationprocrastination.pdf>

Zacks, S., & Hen, M. (2018). Academic interventions for procrastination: A review of the literature. *Journal of prevention & intervention in the community*, 46(2), 117-130. <https://doi.org/10.1080/10852352.2016.1198154>

Zhang, T., Solmon, M. A., Kosma, M., Carson, R. L., & Gu, X. (2011). Need support, need satisfaction, intrinsic motivation, and physical activity participation among middle school students. *Journal of Teaching in Physical Education*, 30(1), 51–68. [10.1123/jtpe.30.1.51](https://doi.org/10.1123/jtpe.30.1.51)

Study 2: Stop Procrastinating on Procrastination! Using Self-Determination Theory and Motivational Interviewing to Target Basic Psychological Needs, Academic Motivation, and Academic Procrastination

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Abstract

Academic procrastination is a pervasive behaviour across university campuses that is negatively affecting students' productivity, mental health, and academic success. Despite these negative outcomes, the research regarding effective interventions remains scarce. Furthermore, there have been no studies that have used a prominent motivational theory as a theoretical framework. According to Self-Determination Theory (SDT), there are three basic psychological needs (BPN; autonomy, competence, and relatedness) that are antecedents to motivation. Previous research has suggested links between BPN satisfaction, academic motivation, and academic procrastination; however, no interventions have focused on these relationships. Additionally, no interventions have used Motivational Interviewing (MI) strategies to target the BPN. The current study designed and implemented a brief intervention using SDT as a theoretical framework and MI strategies to target the three BPN as a means of increasing autonomous motivation and decreasing academic procrastination. Two hundred and twenty-three university students were randomized to the intervention or control groups. The participants completed an online questionnaire pre- and post-intervention. Results suggested that our intervention increased BPN satisfaction; however, it did not significantly increase autonomous motivation or decrease academic procrastination. The findings of this study demonstrate the effectiveness of MI strategies in targeting BPN. Future interventions should aim to examine and capture the potential long-term effects on motivation and procrastination.

Introduction

Across post-secondary campuses, students are increasingly experiencing a phenomenon that impedes their ability to be productive in their studies, negatively affects their mental health, and often results in lower academic achievement (Klingsieck, 2013; Poopola, 2005; Vij & Lomash, 2014). It can be carried out in a variety of ways, including sleeping, checking social media, reading, or watching television (He, 2017; Pychyl et al., 2000). This phenomenon is known as academic procrastination. Academic procrastination is the act of voluntarily delaying an intended course of study-related behaviours despite the negative consequences associated with it (Steel, 2007).

Although procrastination is prevalent across all populations, it is particularly prevalent in the student population, with approximately 70–95% of students reporting that they procrastinate on school-related tasks at least sometimes (Burka & Yuen, 2008; He, 2017; Oram et al., 2020; Schouwenburg et al., 2004; Steel, 2007; Steel & Ferrari, 2013). Furthermore, of those who report they engage in academic procrastination, approximately 50% consider it a problem (Burka & Yuen, 2008). Despite the negative consequences and high prevalence, the research and development of effective group interventions have remained scarce. Furthermore, interventions have not used motivational theories—such as Self-Determination Theory (SDT)—as a theoretical framework, despite academic procrastination’s well-studied relationship with academic motivation. Moreover, some interventions have lacked an evidence-based approach to targeting academic motivation and academic procrastination. For this reason, the current study will examine the effectiveness of an SDT- and Motivational interviewing (MI)-based group intervention, which aims to target academic procrastination through the satisfaction of the basic psychological needs.

Academic Procrastination

Academic procrastination is restricted to the tasks and activities related to learning and studying (Steel & Klingsieck, 2016). These tasks can range from studying for an exam to making appointments with academic advisors. Although previously categorized together, recent literature has distinguished between academic procrastination and strategic delay (Lindblom-Ylänne et al., 2015). Both academic procrastination and strategic delay include the delay of an overt or covert act, but academic procrastination involves involuntary, unnecessary, or irrational delay (Steel, 2007). This has been an important distinction, as studies have shown functional aspects of procrastination (Chu & Choi, 2005). The current study, however, will focus on academic procrastination rather than strategic delay. We will use the term procrastination when referring to academic procrastination for the remainder of the paper.

Procrastination has a bad reputation—and for a good reason. It is associated with several negative academic and non-academic consequences. For example, procrastination has been associated with academic underachievement, difficulty completing course work, amotivation, extended periods of study, and university drop-out (Akbay & Gizir, 2010; Burka & Yuen, 2008; Essau et al., 2008; Wang et al., 2017). Some studies have also found a negative relationship between procrastination and grade point average (GPA); however, other studies have failed to find supporting evidence of this relationship (Schraw et al., 2007; Seo, 2011). Procrastination has been shown to negatively affect student quality of life by contributing to psychological stress, anxiety, depression, and decreased confidence (Grunschel et al., 2013; Katz et al., 2014; Kim & Seo, 2015; Tice & Baumeister, 1997).

To gain a greater understanding of this phenomenon—and eventually develop effective strategies and interventions—researchers have shifted their focus to the potential causes and

antecedents of procrastination. There are several well-established antecedents to procrastination, including automatic negative thoughts (Flett et al., 2012), different types of anxiety (Macher et al., 2012), maladaptive perfectionism (Rice et al., 2012), fear of failure (Hagbabin et al., 1992; Schraw et al., 2007), self-regulatory failure (Loeffler et al., 2019; Senecal et al., 1995; Zimmerman, 2002), low academic self-efficacy or self-esteem (Batoool et al., 2017; Klassen et al., 2008), task aversiveness (Ackerman & Gross, 2005), and low-quality motivation (Klingsieck et al., 2013; Vansteenkiste et al., 2009; Vij & Lomash, 2014). Recently, a significant amount of procrastination research has focused on self-regulation and motivation as primary antecedents of procrastination (Akpur & Yurtseven, 2019; Balkis & Duru, 2016; Demir & Kutlu, 2018; Grund & Fries, 2018; Loeffler et al., 2019; Zhang et al., 2018)

Qualitative studies have also been conducted to understand procrastination. For example, Grunschel et al. (2013) examined the reasons for and consequences of procrastination by interviewing undergraduate students. Their results provided further evidence for many of the antecedents mentioned above, which the authors categorized as either internal or external. Internal reasons were further classified as affective, mental and physical states, behavioural, personality, personal beliefs, competence, previous learning experience, or perceived task characteristics. External reasons were classified as individual working conditions, lecturer characteristics, and institutional conditions. Although much of the study's results supported previous quantitative findings, there were novel findings related to some of the external reasons for procrastination, including lecturer characteristics (e.g., being disorganized, not supportive) and institutional conditions (e.g., too many exams at the end of the semester, poor working conditions in the library).

As researchers continue to examine procrastination's antecedents, the research itself is becoming more specialized and driven by various perspectives and theories (Steel & Klingsieck, 2016; Van Eerde, 2003). Klingsieck et al. (2013) grouped various understandings and antecedents of procrastination into four perspectives: the differential psychology perspective, the clinical psychological perspective, the situational perspective, and the motivational and volitional perspective. These categorizations have been adopted by other procrastination researchers (Steel, 2016).

The differential perspective views procrastination as a personality trait and has focused on the relationship between a variety of personality traits and procrastination. For example, this perspective has examined the relationship between increased neuroticism and academic procrastination (Lee et al., 2006). The clinical psychological perspective focuses on the affective factors related to academic procrastination, such as depression (e.g., negative thinking), anxiety, and low self-esteem (Steel, 2007; Uzun et al., 2014). This perspective typically focuses more on the consequences and correlates of procrastination to inform different clinical intervention strategies. The situational perspective focuses on the environment, situation, or context in which academic procrastination occurs (e.g., institutional characteristics). Additionally, the situational perspective considers task characteristics, such as task difficulty and attractiveness (Ackerman & Gross, 2005; Ferrari & Scher, 2000). Finally, the motivational or volitional perspective views academic procrastination as a failure in motivation or volitional aspects, such as self-control, general volition problems, or time management difficulties (Steel, 2007). Although there has been increased research on the consequences and correlates of academic procrastination, the research regarding effective interventions remains scarce (Zacks & Hen, 2018).

Interventions

Recently, there has been an increase in the number of procrastination interventions developed, using techniques including CBT, acceptance and commitment therapy (Glick & Orsillo, 2015; Häfner et al., 2014, Nordby et al., 2016; Scent & Boes, 2014; Toker & Avci, 2015), academic task goal setting (Gustavson & Miyake, 2017), and meditation and future-oriented self-imagery (Blouin-Hudon & Pychyl, 2017). Although different techniques were used, all of these interventions aimed to target the various antecedents of procrastination. In a recent review of the existing academic procrastination intervention literature by Zacks and Hen (2018), intervention approaches were categorized into three groups: 1) Therapeutic treatment, 2) Therapeutic prevention, and 3) Instructor/teacher intervention. Therapeutic treatments typically sought to intervene after a student had already procrastinated, whereas therapeutic preventions aimed to prevent procrastination's negative consequences. Instructor/teacher interventions were related to interventions facilitated by the course instructor and were nontherapeutic methods of decreasing procrastination (Zacks & Hen, 2018).

The results of their review suggested that behavioural and Cognitive Behavioural Therapy (CBT) techniques were more effective than general counselling and psychotherapy techniques in decreasing procrastination. However, both therapeutic prevention and intervention approaches have been effective. For example, a group intervention program using acceptance and commitment therapy principles by Scent and Boes (2014) taught participants to recognize procrastination as an avoidant mechanism, expand their behaviour repository, and increase participants' connection with their goals and values to generate motivation. Their results suggested increases in psychological flexibility, which can help deal with procrastination (Scent & Boes, 2014). Teacher intervention methods were also found to be effective and easier to implement than therapeutic prevention and treatment interventions. For example, one of the

interventions involved consistent in-class quizzes, which led to more consistent study behaviours (Perrin et al., 2011). Although this review provided useful information regarding the three intervention categories' effectiveness, it did not discuss the interventions in-depth.

A meta-analysis by Van Eerde and Klingsieck (2018) focused on examining the effectiveness of interventions by systematizing and synthesizing the effect sizes of procrastination interventions. Moreover, this meta-analysis provided insight into procrastination interventions' effectiveness by examining design characteristics (e.g., content and application). The authors categorized the existing interventions based on the content and focus of the intervention: 1) Self-regulation (including time management and emotional regulation training); 2) cognitive behavioural therapy; 3) other therapeutic approaches, including paradoxical interventions, coherence therapy, and acceptance and commitment therapy; 4) new developments in the realm of concentrating on individual's strengths and resources.

Self-regulation interventions typically focused on training self-regulation strategies such as self-reflection and monitoring, time management, stimulus control, self-motivation, and emotional regulation (Eckert et al., 2016; Green, 1982; Grunschel et al., 2018; Mühlberger & Traut-Mattausch, 2015). Cognitive behaviour therapy interventions focused on identifying thoughts, categorizing the thoughts as functional or dysfunctional, correcting the dysfunctional thoughts, and transferring corrected thoughts into functional behaviours. These interventions often explored personal experiences and procrastination patterns while focusing on irrational thoughts to change the procrastination behaviour (Ozer et al., 2013). Time-management techniques were included in some of these interventions. Other therapeutic approaches focused on various techniques, such as time-restriction, to create a deeper understanding of procrastination's emotional truth (Rice et al., 2011), or viewing painful thoughts or emotions as

natural and transient (Scent & Boes, 2014). Finally, new interventions typically focused on strength and assertiveness to foster self-efficacy (Moradi, 2015; Visser et al., 2017). As a whole, procrastination interventions typically included elements of psychoeducation, social support, and relaxation techniques (Van Eerde & Klingsieck, 2018).

Their results suggested that academic procrastination typically declined to a medium-to-large extent after an intervention. More specifically, cognitive behavioural therapy interventions had the largest effect sizes. However, this may be due to the intervention's intensity or the interventions' tendency to include other approaches (e.g., self-regulation). The authors also identified limitations associated with the existing interventions, such as small sample sizes and high attrition rates (Van Eerde & Klingsieck, 2018). They recommended that future interventions employ rigorous designs (e.g., randomized controlled trials), ensure adequately powered studies, and include transparent sample procedures and follow-up measures. Furthermore, they recommended that future interventions be both theory- and evidence-based. The authors noted a lack of interventions based on SDT. They recommended that future interventions use this prominent motivation theory as a potential theoretical lens to understand further how to reduce procrastination (Van Eerde & Klingsieck, 2018).

SDT

In the academic domain, SDT research has primarily focused on how students' quality of motivation can impact their academic outcomes. For example, research has shown that students who are more autonomously motivated are less likely to drop out (Vallerand et al., 1993), experience greater learning (Koestner et al., 1984) and more academic success (Black & Deci, 2000). According to SDT, a student must have their three basic psychological needs (BPN)—autonomy, competence, and relatedness—satisfied to develop more autonomous forms of

motivation. The three needs reflect an individual's natural propensity to feel connected to others (i.e., relatedness), to feel effective in one's actions (i.e., competence), and to feel volitional and in control of one's behaviour (i.e., autonomy; Deci & Ryan, 1985). These needs are often satisfied when an autonomy-supportive environment is present. Autonomy-supportive environments encourage individuals' independence, choice, and decision-making (Adie et al., 2008).

Previous research has suggested links between BPN, academic motivation, and procrastination, including direct links between BPN satisfaction and lower procrastination (Cavusoglu & Karatas, 2015; Study 1). Study 1 tested a model in which the relationship between BPN satisfaction and frustration and procrastination was mediated by autonomous and controlled motivation and amotivation. Our results suggested significant relationships between BPN satisfaction, autonomous and controlled motivation, and amotivation, as well as between BPN frustration and autonomous motivation and amotivation. Autonomous motivation and amotivation were significant mediators in the relationship between BPN satisfaction and academic procrastination. In contrast, autonomous motivation was the only significant mediator in the relationship between BPN frustration and academic procrastination. These results provide evidence of the relationship between SDT variables and procrastination and, thus, the potential utility of targeting these variables in an intervention for academic procrastination.

There have been interventions that have used SDT as a theoretical framework to target a variety of different academic variables with positive results (Black & Deci, 2000; Chang et al., 2016; Williams & Deci, 1996); however, there have been no interventions that have focused on procrastination. Due to the lack of interventions based on motivational theory in the current procrastination literature, the use of SDT as a theoretical framework for a procrastination

intervention would provide significant insights. For example, an intervention based in SDT could provide important insights on how the environment—as opposed to the individual—can reduce procrastination. Although there would be benefits to the use of SDT as a theoretical framework for a procrastination intervention, SDT interventions do not typically use evidence-based or systematic approaches to targeting these variables. Some SDT researchers have suggested integrating SDT and motivational interviewing (MI) techniques to address this issue, as MI techniques closely align with SDT’s fundamental positions on human growth and motivation.

SDT and MI

MI is a directive, person-centred approach to counselling that endorses a collaborative conversation style to strengthen a person’s motivation and commitment to change (Miller & Rollnick, 2013). MI aims to help clients change by exploring and resolving ambivalence associated with specific behaviours. It has been beneficial for change-averse individuals. The strategies of MI reflect a more autonomy-supportive approach to increasing a client’s intrinsic motivation as a means of moving them toward change. This approach is grounded in principles that reflect the “spirit” of MI, including acceptance, compassion, collaboration, and evocation (Miller & Rollnick, 2013).

Although research on MI in the academic domain is still in its infancy, using MI as an evidence-based, practical approach to targeting BPN and motivation is not a novel idea. Many SDT and MI researchers have alluded to the usefulness of integrating the two approaches for creating efficacious interventions for those in clinical trials, but also for more general populations (Miller & Rollnick, 2012; Patrick & Williams, 2012; Vansteenkiste & Sheldon, 2006). Furthermore, the combination of the applied approach of MI and the theoretical approach of SDT can progress both motivational perspectives (Miller & Rollnick, 2013; Vansteenkiste &

Sheldon, 2006). There are strategies in MI that target each of the BPN, such as providing positive feedback and supporting clients' need for self-efficacy (i.e., competence), allowing clients to explore reasons for or against making a change and minimizing pressure (i.e., autonomy), and providing an empathic and non-judgemental environment (i.e., relatedness; Friederichs et al., 2016; Patrick & Williams, 2012). These strategies often result in an autonomy-supportive environment, which is central to both the facilitation of BPN and the practice of MI.

Despite optimism regarding the complementarity of the approaches and the potential utility in targeting procrastination, the only intervention studies thus far that have adopted this approach have been within the context of health behaviours (Duda et al., 2014; Fortier et al., 2007; McFadden et al., 2017). Although these studies found evidence supporting MI's use to target SDT variables, they often use single-subject designs, which can be costly and resource-intensive (Byiers et al., 2012). Recent research has suggested advantages to using MI in a group setting, such as increases in perceived autonomy (Foote et al., 1999), self-efficacy (Mendel & Hipkins, 2002), treatment engagement and attendance (Lincourt et al., 2002), and the recognition of problems (Murphy et al., 2002). Furthermore, group MI maximizes the number of individuals receiving an intervention while minimizing the number of facilitators, resulting in a more cost-effective intervention (Strait, Williams, & Peters, 2019).

Current Study

Given the established relationships between BPN, academic motivation, and procrastination, and the suggestion that SDT may be a useful theory to guide procrastination interventions, the current study aimed to develop, implement, and test the efficacy of an SDT- and MI-based group intervention. More specifically, it examined whether MI techniques can satisfy the BPN, leading to increased autonomous motivation and decreased controlled

motivation, amotivation, and procrastination. From a practical perspective, this intervention tested a brief group intervention that could be easily disseminated across university campuses to impact academic procrastination. There have been no interventions thus far that have taken this specific approach or examined these hypotheses. Therefore, the current study contributes significantly to the existing procrastination intervention literature. Although the focus of this study is on the efficacy of the intervention, the current study will also examine the structural model from (Study 1) in an effort to replicate our initial results.

Hypotheses

1. The intervention group participants will experience significant increases in BPN satisfaction and autonomous motivation from pre- to post-intervention.
2. The intervention group participants will experience significant decreases in BPN need frustration, controlled motivation, amotivation, and procrastination from pre- to post intervention.
3. The results from Study 1 will be replicated in the present study.

Methods

Participants

Participants in the current study were undergraduate students from a large Canadian University ($N = 258$). Students were recruited through advertisements on campus and a research participant pool whereby students receive course credit for participation in studies. Participants were removed if they completed less than 50% of the survey or if they completed the survey in under 12 minutes, as the survey was estimated to take approximately 12–15 minutes minimum. Of the remaining sample ($n = 223$), approximately 98% of participants were between the ages of

18–25 ($n = 219$). The majority of participants were female ($n = 175$) and in their first year ($n = 124$). Participants identified as Caucasian ($n = 87$), Asian ($n = 42$), African-American ($n = 29$), Arabic ($n = 24$), Aboriginal ($n = 5$), Hispanic ($n = 4$), while some indicated other ($n = 26$) or declined to answer ($n = 6$). Students were enrolled in a number of programs, such as psychology ($n = 33$), nursing ($n = 15$), business ($n = 2$), economics ($n = 1$), and other ($n = 172$).

Approximately 25% of the sample ($n = 56$) were currently seeking academic services. The most frequently used academic service was academic accommodation ($n = 20$). When asked to what degree do you procrastinate on school activities in general, approximately 83% of participants indicated at least sometimes. However, only 1 participant indicated that they never participated in any academic tasks in the procrastination questionnaire.

Measures

Demographic questionnaire

Participants provided basic information regarding their age, gender, first language, socioeconomic status, and ethnicity. Participants also provided information regarding previous or current mental health diagnoses and any past or current treatment. Additionally, the participants provided information related to their academic standing and past or current use of academic services.

Basic Psychological Need Satisfaction and Frustration Scale

BPN satisfaction and frustration were measured using the Basic Psychological Need Satisfaction and Frustration scale – work domain (BPNSFS; Chen et al., 2015; Schultz et al., 2015). The scale was adapted to examine need satisfaction and frustration within the school context in the current study. The BPNSFS is a 24-item scale that organizes the BPN into six

subscales. Three of the scales aim to measure the satisfaction of the three psychological needs of autonomy (e.g., *I feel that my decisions at school reflect what I really want.*), competence (e.g., *At school, I feel capable at what I do.*), and relatedness (e.g., *I feel connected with people who care for me at school, and for whom I care at school.*). The other three scales aim to measure the frustration of the psychological needs autonomy (e.g., *I feel forced to do many things at school I wouldn't choose to do.*), competence (e.g., *I feel insecure about my abilities at school.*), and relatedness (e.g., *I feel that people who are important to me at school are cold and distant towards me.*). Participants were asked to indicate how much they agreed with each of the statements, given their experiences at school over four weeks. Items are rated on a 7-point Likert scale, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*), with higher scores indicating higher need satisfaction or frustration. All subscales have adequate internal consistency (Chen et al., 2015; Cordeiro et al., 2016). The same approach for the structural model in Study 1 was used to create latent variables. The satisfaction composite had a Cronbach's alpha of .89, and the frustration composite had a Cronbach's alpha of .85.

Academic Motivation Scale

The Academic Motivation Scale (AMS; Vallerand et al., 1992) is a 28-item scale used to measure academic motivation in college and/or university populations. The AMS assesses three types of intrinsic motivation (i.e., to know, toward accomplishment, and to experience stimulation), three types of extrinsic motivation (i.e., identified, introjected, and external regulation), and amotivation. Each of the seven subscales consists of four items, which are responded to on a 7-point Likert-Scale, ranging from 1 (*does not correspond at all*) to 7 (*corresponds exactly*). Given that previous research has indicated that identified motivation reflects more autonomous extrinsic motivation, these items were included in the autonomous

motivation variable (e.g., *For the pleasure I experience while I am surpassing myself in one of my personal accomplishments*; Vallerand et al., 1993; Vansteenkiste et al., 2004). Introjected and external regulation items were included in the controlled motivation variable (e.g., *In order to obtain a more prestigious job later on*). The remaining items made up the amotivation variable (e.g., *I don't know; I can't understand what I am doing in school*). In the current study, the Cronbach's alpha for the autonomous motivation variable was .92, .86 for controlled motivation, and .88 for amotivation. The same approach for the structural model in Study 1 was used to create latent variables.

Procrastination Assessment Scale for Students

Procrastination was measured using the Procrastination Assessment Scale for Students (PASS; Solomon & Rothblum, 1984). The PASS is a two-part, 44-item self-report measure. Part 1 consists of 18-items that measure the level of procrastination in six academic domains, including writing a term paper, studying for exams, keeping up with weekly reading assignments, academic administrative tasks, attendance tasks, and school activities in general. For the purpose of this study, only items in part 1 were examined. The items in part 1 are rated on a 5-point Likert scale. The first item measures the frequency of procrastination on the academic tasks (e.g., *To what degree do you procrastinate on writing a term paper*) and ranges from 1 (*never procrastinate*) to 5 (*always procrastinate*). The following item measures the degree to which procrastination on this task was a problem (e.g., *To what degree is procrastination on writing a term paper a problem for you*) and ranges from 1 (*not at all a problem*) to 5 (*always a problem*). Finally, the third item measures the degree to which the student wants to decrease their procrastination on the task (e.g., *To what extent do you want to decrease your tendency to procrastinate on writing a term paper?*) and ranges from 1 (*do not*

want to decrease) to 5 (*definitely want to decrease*). For the purpose of this study, only the first two items from the six sections of the PASS were used, as per PASS scoring instructions. This variable had a Cronbach's alpha of .82. The same approach for the structural model in Study 1 was used to create latent variables.

Satisfaction Survey

The satisfaction survey is a 10-item scale used to measure the participants' satisfaction with the workshop, developed by the first author and her supervisor (M. Rogers). Participants responded to statements on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Example of survey items are "*I enjoyed the workshop*" and "*I found this workshop helpful*". The participants also had the ability to provide further comments regarding the workshop. The participants completed this survey upon completion of the second session.

Client Evaluation of MI (CEMI).

The CEMI (revised) is an 11-item self-report measure aimed at assessing the client perceptions of MI (Madson et al., 2013). The CEMI also provides a way to assess the quality of MI being delivered to clients. Participants rate the degree to which the MI clinician demonstrated each behaviour on a 4-point Likert scale ranging from 1 (not at all) to 4 (a great deal). Example items include "*helps you talk about changing your behaviour*" and "*helps you feel hopeful about changing your behaviour*". The internal consistency ranged from .88 to .91 between the two subscales (relational and technical; Madson et al., 2013).

Procedure

Participants signed up for the intervention on the university's student research pool or contacted the researcher indicating their interest in participating. The study was only made

available to those between the ages of 18 and 25 on a student research pool. The individuals recruited via posters or in-class presentations were all asked to confirm their age to ensure they met the eligibility criteria. If they met the criteria, they signed up for one of the time slots of the workshop. All participants were randomized to the intervention (INT) or control (CON) group using an online randomizing tool (specifically, www.randomlists.com/team-generator). One-hundred and fifteen participants were randomized to the INT group, with the remaining one-hundred and eight to the CON group. If randomized to the INT group, participants provided consent and were sent a link to the pre-questionnaire one week prior to the intervention. The participants randomized to the INT group then attended part 1 of the workshop, a one-hour session facilitated by the first author (RO). During the time between part 1 and part 2 of the workshop, students were asked to be mindful of their procrastinating behaviours by counting the frequency of their procrastination, focusing on why they were procrastinating, and tuning into their emotions when procrastinating. The students then attended part 2 of the workshop one week later. The groups consisted of no more than 10 people—the ideal limit for a successful psychoeducational MI group (Wagner & Ingersoll, 2013). At the end of the second workshop, participants were sent a link to the post-questionnaire. This was the same as the pre-questionnaire with the addition of a satisfaction survey and a MI fidelity questionnaire. The entire workshop was completed over three weeks. Upon completion of the post-workshop questionnaire, participants received their ISPR credits or \$50 gift-card.

If randomized to the CON group, participants completed the pre- and post-questionnaires at the same time as the INT group. The pre- and post-questionnaires were the same as the INT group, except for the satisfaction survey and MI fidelity questionnaires. The control group was provided with information about other services available at the school and informed that they

could participate in the workshop after their initial participation was completed. Upon completion of the post-questionnaire, participants received their ISPR credits or \$20 gift-card. The majority of control participants opted not to participate in the intervention after their initial participation in the CON group.

All participants were emailed three months after their second workshop date to complete a voluntary follow-up questionnaire. This questionnaire was the same as the previous questionnaires, with the addition of outcome questions for the INT group (e.g., *Since the workshop, I have reduced my procrastination behaviours*). The INT group follow-up questionnaire also included an open-ended question that asked whether there was anything from the workshop they continued to find helpful.

Intervention

The Stop Procrastinating on Procrastination workshop is a two-session, semi-structured, psychoeducational workshop that aimed to target SDT associated variables (e.g., BPN and academic motivation) using MI techniques. Each session was approximately 60 minutes long. MI techniques were used to elicit dynamic group discussions that aimed to help move participants towards change. Previous SDT- and MI-based intervention studies were reviewed during the development of the workshop and workshop materials (Reich et al., 2015; Strait et al., 2019), as well as MI group intervention protocols (Hardcastle et al., 2017; Miller & Rollnick, 2013; Wagner & Ignersoll, 2013).

The workshop aimed to decrease procrastination and increase autonomous academic motivation by targeting students' BPN and their desire to change their behaviour. During the workshop, participants moved through the four phases of MI—engaging, focusing, evoking, and

planning—described by Miller & Rollnick (2013). To provide participants with a sense of choice and agency (i.e., autonomy) and feelings of effectiveness (i.e., competence), the group discussed pertinent information about procrastination, reflected on academic goals and values, confidence, and discussed appropriate strategies. The group-based format allowed the facilitator and the group members to openly discuss their experiences with procrastination, fostering satisfying social relationships between the participants (i.e., relatedness). Throughout the entire workshop, relational MI techniques were used, including open-ended questions, affirmations, reflective statements, emphasizing autonomy, double-sided reflections, and summary statements (Hardcastle et al., 2017; Miller & Rollnick, 2013). In the form of activities, content behaviour change techniques were also used throughout the workshop and are highlighted below (Hardcastle et al., 2017).

Part 1 of the workshop primarily focused on moving through the first two processes of MI, namely, engaging and focusing on the use of MI spirit and techniques. The facilitator began by briefly introducing the focus of the workshop and discussing confidentiality with the group members. In the engaging phase, the facilitator asked each group member to say their first name and an interesting fact to establish a positive group dynamic. After this brief icebreaker, the facilitator asked participants how they defined procrastination before providing the definition of procrastination presented in the research. The facilitator then explored the participants' perceptions of prevalence and social norms related to procrastination. This information was collected using an evoking technique known as "elicit-provide-elicit" (Rollnick et al., 2008). Previous MI interventions (Chan et al., 2007) have used information or statistics specific to the population they are working with for this purpose (e.g., drinking behaviours in the U.S.). For this

workshop, we detailed the prevalence of procrastination in college students and then introduced statistics from the University of Ottawa.

Participants were asked whether the presented statistics were accurate regarding their friends' and peers' behaviour to provide a reference for talking about their own behaviours. The participants then discussed how their behaviours compared. The participants were then asked about their own procrastination frequency and why they may be engaging in these behaviours. The facilitator then discussed some of the common reasons for procrastination, such as personality, situational characteristics, self-regulation, and motivation.

After discussing the reasons for procrastination, the facilitator began eliciting reasons for change, which transitioned into the goals and values activity. Values exploration allows individuals to reflect on their reasons for change and develops a discrepancy between their current behaviour and their goals and values (Hardcastle et al., 2017). During this activity, the participants wrote down three important academic goals and chose important values from a deck of value cards. Participants then discussed their three goals and the values they chose. During this activity, the facilitator asked questions such as, "What does this value mean to you?" and "How does this value relate to your goals?". After this activity, the facilitator moved into the evoking phase.

During this phase, importance and confidence rulers were used to evoke change (Hardcastle et al., 2017). Participants were asked to arrange themselves physically on a scale of 1 to 10 based on the facilitator's questions. For example, the participants were asked how important it is for them to change their behaviour and how confident they feel in terms of their ability to change it. The facilitator then discussed with each participant why they chose the number they did. This activity helps highlight an individual's competence and their reasons for

change. This activity also helps to facilitate change talk among the participants. The facilitator ended the first session by summarizing what was discussed during the session concerning the group members' goals, reasons for change, and abilities.

After one week, participants returned for part 2 of the workshop. Part 2 focused on moving through the final two processes of MI, namely, evoking and planning. Part 2 began by summarizing what was discussed in the previous workshop and their week between sessions. The facilitator then asked participants to think of a specific time when they procrastinated. During this portion of the workshop, participants discussed specific details of when and why they procrastinated, how they were feeling, and the barriers that were present. Participants were then asked how they could have overcome those barriers, which facilitated hypothetical thinking and troubleshooting (Hardcastle et al., 2007). These evoking techniques provided the facilitator with a better understanding of participants' motivations and potential strategies. This portion of the workshop ended with a group discussion about the potential pros and cons of changing or staying the same. This is another evoking technique known as "running head start" that challenges participants to explore reasons for change.

The facilitator then began a discussion that explored past successes and strengths. Participants were asked to think of a time when they did not procrastinate. This discussion focuses on highlighting their successes in exploring and identifying their own strengths, skills, and strategies (Hardcastle et al., 2017). The facilitator then discussed some techniques that were highlighted by the group and asked participants to suggest additional strategies. Participants were then asked if they could think of ways that others or the university could help reduce their procrastination. This discussion was important to elicit different ways students can obtain emotional support from peers or their university.

After this brief discussion, the participants moved into the final MI phase of planning. Participants completed a change plan, which included identifying their goals and motivations, as well as the different barriers and solutions for navigating their procrastination. This activity ensured that the participants were actively thinking about how they could begin working towards reducing their procrastination. They explored different change expectations and considered change options. Furthermore, this activity allowed participants to commit to making a change. At the end of the workshop, the facilitator discussed the change plans with the participants, assessed their confidence, and provided affirmations for each group member. Figure 1 includes a table describing the intervention techniques.

Data Cleaning and Analysis

All participants had complete data except for those who terminated their participation early. Consequently, there were 32 participants from the INT group (28%) and 15 from the CON group (14%) who were missing data for outcome measures collected post-intervention (T2) and, thus, removed listwise from the analyses. The INT group's attrition rate was predominately due to uncontrollable factors, such as school closure due to weather and illness reported by participants. Independent sample t-tests revealed that those who did not complete the study did not significantly differ on any demographic or outcome variables. Skewness and kurtosis were calculated for all outcomes variables and determined to fall within the normal distribution. All outliers were Winsorized to retain data.

Power Analyses. An a priori power analysis was conducted using G*Power3 (Faul et al., 2007) for repeated measures ANOVA within-between interactions using a two-tailed test, a small effect size ($f(V) = .25$), and an alpha of .05. Results showed that a total sample of 34

Figure 1.*Motivational Interviewing Techniques used in intervention and the targeted BPN*

Motivational Interviewing Techniques	Description	Basic Psychological Need
Affirmations	Provided encouragement and positive feedback to participants	<i>Autonomy, Competence</i>
Reflections on procrastination	Provided information about antecedents of procrastination	<i>Autonomy, competence</i>
Exploration of prevalence and social norms (i.e., Normalizing)	Discussed the prevalence of procrastination and frequency of procrastination in the group	<i>Relatedness</i>
Exploring goals and values	Explored participants' goals and values to reflect on their reasons for change	<i>Autonomy, Relatedness</i>
Confidence ruler	Asked participants how important it is to change their behaviour and how confident they feel in their ability to change it	<i>Competence</i>
Looking back and troubleshooting	Discussed a time when participants did procrastinate, identified barriers and solutions	<i>Competence</i>
Identifying past successes and strengths	Discussed a time when participants overcame their barriers and did not procrastinate	<i>Competence</i>
Brainstorming	Discussed a variety of different strategies that have worked in the past, while emphasizing the importance of doing whatever works before for them	<i>Autonomy, Competence</i>
Development of Change Plan	Identified an important goal that they would like to change, while also identifying potential barriers and solutions	<i>Competence</i>
OARS (Open-ended questions, affirmations, reflective statements, summaries)	All interactions with participants consistently used OARS	<i>Autonomy, Competence, Relatedness</i>

participants with two equal-sized groups of $N = 17$ was required to achieve a power of .80 and, thus, our analyses were sufficiently powered.

Hypothesis Testing

Intervention outcomes were examined using two-way mixed ANOVAs. These were conducted with 1 between-subjects independent variable (IV; experimental condition – INT or CON), 1 within-subjects IV (time – pre or post) and dependent variables (BPN satisfaction, BPN frustration, autonomous and controlled motivation, amotivation, and procrastination). GLM Repeated Measures in SPSS Version 21.0 was used to run these analyses. Follow-up analyses were conducted for significant interactions using independent- and paired-samples t-tests.

SEM direct and mediation models were tested using pre-intervention (T1) data and AMOS software to replicate the findings from Study 1. Latent variables were created using the same method as Study 1. Maximum likelihood estimation and bootstrapping were used for indirect and direct effects.

Results

Preliminary Analyses

Random Assignment. In order to test randomization, independent-samples t-tests were used to compare T1(pre) scores between the experimental and control group. Despite the random assignment of the participants to the two experimental conditions, the control group had significantly higher scores at T1 on autonomous motivation, $t(221) = 2.13, p = < .05, d = 0.29$ and controlled motivation $t(221) = 2.75, p = < .01, d = 0.37$.

Descriptive statistics

Means, standard deviations, and the results from paired-sample t-tests for all outcome variables are included in Table 1 for the INT group and Table 2 for the CON group.

Table 1.*Means, Standard Deviations and Paired-Samples T-Test Results (INT)*

Outcome	T1		T2		n	95% CI for Mean Difference	<i>t</i>	<i>d</i>
	M	SD	M	SD				
BPN Satisfaction and Frustration								
BPN SAT	4.71	.82	4.95	.82	82	-.36, -.13	4.35**	.29
BPN FRUS	3.78	.96	3.61	.98	82	.03, .31	-2.34*	.18
Basic Psychological Need Satisfaction Variables								
Autonomy	4.56	1.09	4.77	1.05	82	-.39, -.04	2.50*	.20
Competence	4.61	1.21	5.01	1.10	82	-.57, -.24	4.98**	.35
Relatedness	4.98	1.13	5.09	1.09	82	-.27, .04	1.52	.10
Academic Motivation Variables								
Autonomous	4.78	.98	4.84	0.96	82	-.19, .06	1.07	0.06
Controlled	5.24	1.11	5.36	1.01	82	-.26, .03	1.63	0.11
Amotivation	2.03	1.18	2.08	1.21	82	-.22, .12	.61	0.06
Academic Procrastination								
Procrastination	3.23	0.60	3.21	0.71	82	-.08, .12	-.45	0.04

Note. BPN SAT = Basic psychological need satisfaction; BPN FRUS = Basic psychological need frustration;

* $p \leq .05$. ** $p \leq .001$

Table 2.*Means, Standard Deviations and Paired-Samples T-Test Results (CON)*

Outcome	T1		T2		n	95% CI for Mean Difference	<i>t</i>	<i>d</i>
	M	SD	M	SD				
BPN Satisfaction and Frustration								
BPN SAT	4.73	1.01	4.78	1.09	83	-.18, -.07	.84	.05
BPN FRUS	4.04	1.07	3.95	1.14	83	.05, .24	-1.27	.08
Basic Psychological Need Satisfaction Variables								
Autonomy	4.65	1.14	4.68	1.11	83	-.24, .16	.30	.03
Competence	4.61	1.30	4.72	1.35	83	-.25, .03	1.57	.08
Relatedness	4.91	1.30	4.95	1.39	83	-.25, .16	.39	.03
Academic Motivation Variables								
Autonomous	5.06	.86	5.13	.94	83	-.20, .05	1.12	.08
Controlled	5.58	.93	5.62	.95	83	-.18, .10	.56	.04
Amotivation	1.93	.96	1.96	1.17	83	-.25, .19	.24	.03
Academic Procrastination								
Procrastination	3.21	.60	3.20	.72	83	-.08, .12	-.42	.02

Note. BPN SAT = Basic psychological need satisfaction; BPN FRUS = Basic psychological need frustration

* $p \leq .05$. ** $p \leq .001$

Correlations

Correlations for all variables at T1 are included in Table 3, and correlations for all variables at T2 are included in Table 4. At T1, BPN satisfaction was significantly associated with all variables except for controlled motivation. BPN frustration was significantly associated with all variables. At T2, the correlations results remained the same, except for a non-significant association between autonomous motivation and procrastination. All associations at T1 and T2 were in the expected direction (e.g., BPN satisfaction was negatively associated with procrastination). Interestingly, BPN satisfaction and frustration were more highly correlated with procrastination than any of the motivation variables.

Univariate analyses

Procrastination. A mixed ANOVA suggested no main effect of condition, $F(1, 174) = 0.03, p = .86, \eta_p^2 = .00$ or time, $F(1, 174) = 0.38, p = .54, \eta_p^2 = .00$ on procrastination, and no interaction of condition and time on procrastination, $F(1, 174) = 0.001, p = .97, \eta_p^2 = .00$.

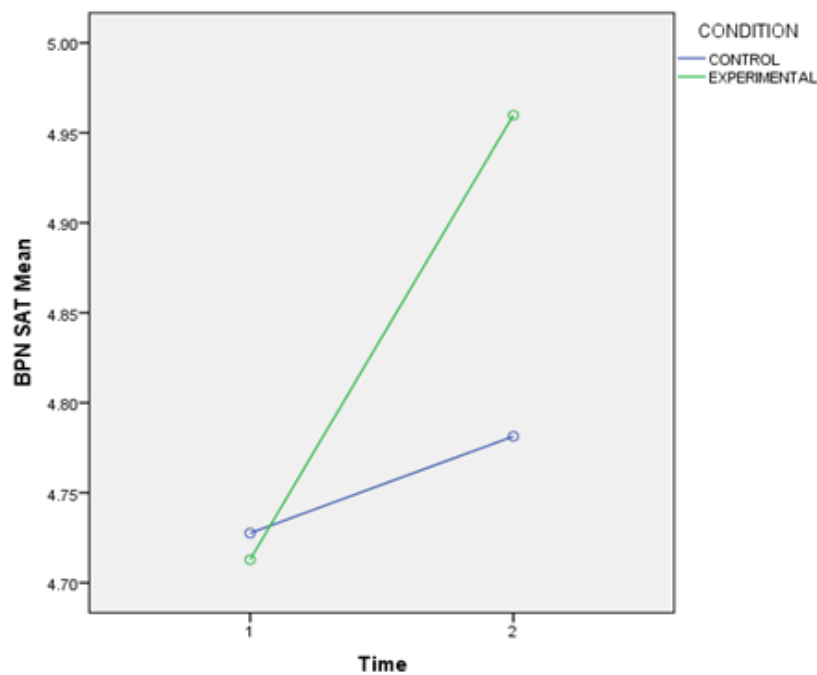
Basic psychological need satisfaction. A mixed ANOVA was conducted with basic psychological need satisfaction. There was a large main effect of time on basic psychological need satisfaction, $F(1, 174) = 12.14, p < .01, \eta_p^2 = .07$. There was no main effect of condition on need satisfaction, $F(1, 174) = 0.36, p = .55, \eta_p^2 = .00$. There was a significant two-way interaction of time and condition (See Figure 2) on basic psychological need satisfaction, $F(1, 174) = 5.01, p = 0.03, \eta_p^2 = .03$. This effect was considered small.

We followed up the significant interaction of basic psychological need satisfaction with simple main effects using paired-samples t-tests. When conducting paired-samples t-tests, results showed that the INT group experienced significant increases in BPN satisfaction between

T1 ($M = 4.71$, $SD = .82$) and T2 ($M = 4.95$, $SD = .82$), $t(82) = -4.35$, $p < .001$, $d = .30$, whereas the CON group did not, $t(92) = -0.84$, $p = .40$, $d = .05$ (See Table 2).

Figure 2.

Interaction Effect of Time and Condition on BPN Satisfaction



Note. BPN SAT = Basic psychological need satisfaction

Table 3.*Correlations of all variables at T1*

Variable	1	2	3	4	5	6	7	8	9
1.BPN SAT	--	-0.77**	0.41**	0.02	-0.48**	0.79**	0.71**	0.83**	-0.33**
2.BPN FRUS		--	-0.24**	0.15*	0.49**	-0.54**	-0.70**	-0.55**	0.30**
3.AUT MOT			--	0.43**	-0.34**	0.45**	0.33**	0.18**	-0.16*
4.CON MOT				--	0.01	0.09	0.01	-0.04	0.08
5.AMOT					--	-0.50**	-0.39**	-0.24**	0.21**
6.AUT SAT						--	0.58**	0.29**	-0.32**
7.COMP SAT							--	0.34**	-0.37**
8.REL SAT								--	-0.11
9.PROC									--

Note. BPN SAT = Basic psychological need satisfaction; BPN FRUS = Basic psychological need frustration; AUT MOT = Autonomous Motivation; CON MOT = Controlled Motivation; AMOT = Amotivation; AUTO SAT = Autonomous Motivation; COMP SAT = Competence satisfaction; REL SAT = Relatedness satisfaction; PROC = Procrastination

* $p \leq .05$. ** $p \leq .01$

Table 4.*Correlations of all variables at T2*

Variable	1	2	3	4	5	6	7	8	9
1.BPN SAT	--	-0.72**	0.50**	0.13	-0.42**	0.83**	0.84**	0.78**	-0.21**
2.BPN FRUS		--	-0.25**	0.15*	0.47**	-0.52**	-0.65**	-0.57**	0.39**
3.AUT MOT			--	0.44**	-0.41**	0.50**	0.42**	0.32**	-0.04
4.CON MOT				--	0.02	0.08	0.03	0.21**	0.19*
5.AMOT					--	-0.46**	-0.32**	-0.26**	0.19*
6.AUT SAT						--	0.63**	0.45**	-0.14
7.COMP SAT							--	0.43**	-0.23**
8.REL SAT								--	-0.15*
9.PROC									--

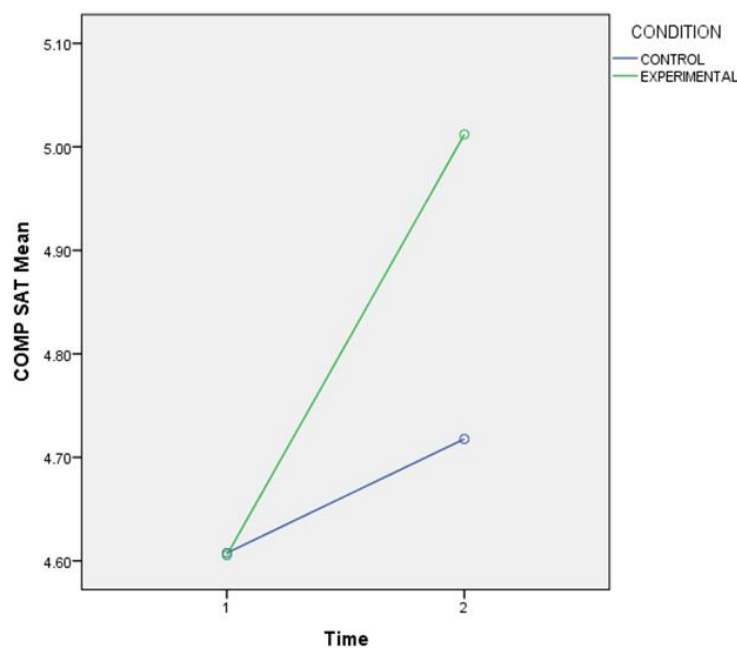
Note. BPN SAT = Basic psychological need satisfaction; BPN FRUS = Basic psychological need frustration; AUT MOT = Autonomous Motivation; CON MOT = Controlled Motivation; AMOT = Amotivation; AUTO SAT = Autonomous Motivation; COMP SAT = Competence satisfaction; REL SAT = Relatedness satisfaction; PROC = Procrastination

* $p \leq .05$. ** $p \leq .01$

Autonomy, Competence, and Relatedness Satisfaction. Given that we found a significant interaction of time and condition on basic psychological need satisfaction as a composite, need satisfaction was further broken down by each basic psychological need to determine any differential effects. Results revealed that there was a large significant effect of time on competence satisfaction, $F(1, 174) = 23.29, p < .001, \eta_p^2 = .12$ and a significant two-way interaction of time and condition for competence satisfaction, $F(1, 174) = 7.66, p < .0, \eta_p^2 = .04$ (see Figure 3). None of the other basic psychological needs had significant main effects or interactions.

Figure 3.

Interaction Effect of Time and Condition on Competence Satisfaction



Note. COMP SAT = Competence satisfaction

We followed up the significant interaction of competence satisfaction with simple main effects using independent- and paired-samples t-tests. An independent samples t-test revealed there was no difference in competence satisfaction between INT and CON groups at T1 $t(221) = -0.101, p = .92$ or T2 (post), $t(174) = -1.57, p = .17$. When conducting paired-samples t-tests, however, results showed that the INT group experienced significant increases in competence satisfaction between T1 ($M = 4.61, SD = 1.21$) and T2 ($M = 5.01, SD = 1.10$), $t(82) = -4.98, p < .001, d = .35$ whereas the CON group did not, $t(92) = -1.57, p = .12$ (See Table 2).

Basic psychological need frustration. There was a small main effect of time on basic psychological need frustration, $F(1, 174) = 6.38, p < .05, \eta_p^2 = .04$ and a marginally significant effect of condition, $F(1, 174) = 4.05, p = .05, \eta_p^2 = .02$. There was no significant two-way interaction of time and condition for basic psychological need frustration, $F(1, 174) = .504, p = .48, \eta_p^2 = .00$.

Autonomous Motivation. There was no main effect of time on autonomous motivation $F(1, 174) = 2.40, p = .12, \eta_p^2 = .14$. There was a small, significant effect of condition $F(1, 174) = 4.78, p = .03, \eta_p^2 = .03$. There was no significant two-way interaction of time and condition for autonomous motivation, $F(1, 174) = .002, p = .97, \eta_p^2 = .00$.

Controlled Motivation. There was no main effect of time, $F(1, 174) = 2.34, p = .13, \eta_p^2 = .01$ on controlled motivation. There was, however, a significant effect of condition $F(1, 174) = 4.36, p < .05, \eta_p^2 = .002$. There was no significant two-way interaction of time and condition for controlled motivation, $F(1, 174) = .55, p = .46, \eta_p^2 = .00$.

Amotivation. There was no main effect of time, $F(1, 174) = .30, p = .58, \eta_p^2 = .00$ or condition, $F(1, 174) = .47, p = .49, \eta_p^2 = .00$. There was no significant two-way interaction of time and condition for amotivation, $F(1, 174) = .03, p = .86, \eta_p^2 = .00$.

Table 5.*Intervention effects*

	EXPERIMENTAL CONDITION				TIME				TIME x CONDITION			
	<i>F</i>	<i>df</i>	<i>p</i>	η_p^2	<i>F</i>	<i>df</i>	<i>p</i>	η_p^2	<i>F</i>	<i>df</i>	<i>p</i>	η_p^2
BPN Satisfaction and Frustration												
BPN SAT	.36	1, 174	.55	.00	12.14	1, 174	.00	.07	5.01	1, 174	.03	.03
BPN FRUS	4.05	1, 174	.05	.02	6.48	1, 174	.01	.04	.50	1, 174	.48	.00
Basic Psychological Need Satisfaction Variables												
Autonomy	.00	1, 174	.99	.00	3.93	1, 174	.07	.02	1.86	1, 174	.16	.01
Competence	.67	1, 174	.42	.00	23.29	1, 174	.00	.12	7.66	1, 174	.01	.04
Relatedness	.38	1, 174	.54	.00	1.45	1, 174	.23	.01	.35	1, 174	.56	.00
Academic Motivation Variables												
Autonomous	4.78	1, 174	.03	.03	2.40	1, 174	.12	.14	.00	1, 174	.97	.00
Controlled	4.36	1, 174	.04	.02	2.34	1, 174	.13	.01	.55	1, 174	.46	.00
Amotivation	.47	1, 174	.49	.00	.30	1, 174	.58	.00	.03	1, 174	.86	.00
Academic Procrastination												
Procrastination	.03	1, 174	.86	.00	.38	1, 174	.54	.00	.00	1, 174	.97	.00

Note. BPN SAT = Basic psychological need satisfaction; BPN FRUS = Basic psychological need frustration

* $p \leq .05$. ** $p \leq .00$

Satisfaction Survey. Approximately 97% of participants indicated they felt satisfied with their experience. The mean score for the item “*Overall, I am satisfied with this experience*” rated on a scale from 1 to 5 was high ($M=4.58$, $SD=0.54$). Also, approximately 83% of participants felt more in control of their procrastination behaviour after the workshop, and 95% indicated they felt they could change their behaviours after the workshop. Finally, 98% felt the workshop motivated them to change their behaviours. Additional comments provided by participants also reflected a high level of satisfaction: “After the first session, I looked forward to the next one. It was very helpful and motivating” and “I really like how we openly reflected about our procrastinating activities. It helped me notice things/patterns to my procrastination.”

MI Fidelity. In order to assess the quality and fidelity of the facilitator’s use of MI, participants completed the CEMI along with their post-questionnaire (Madson et al., 2013), and two MI-trained independent raters randomly coded a 30% random selection of all workshops using the Motivational Interviewing Integrity Scale (MITI 4.2.1; Moyers et al., 2014), resulting in $n=10$ workshops. The MITI uses global scores and behaviour counts to assess MI fidelity. Global scores and behaviour counts are assessed within a single review of 20-minute segments of workshop audio recordings. According to the results obtained through the CEMI, the facilitator’s behaviours were highly consistent with MI ($M=46.26$, $SD=4.85$, maximum possible score was 55). The MITI results supported the CEMI results, as the facilitator received global scores within the fair to good threshold for relational and technical proficiency between raters. The facilitator also had acceptable counts of MI-adherent behaviours versus MI non-adherent behaviours.

Follow-up. Unfortunately, we were not successful in obtaining a significant number of follow-up responses. Approximately 11 responses were obtained from those who were in the

INT group and 8 responses from those in the CON group. Due to this small sample size, we opted not to conduct longitudinal quantitative analysis.

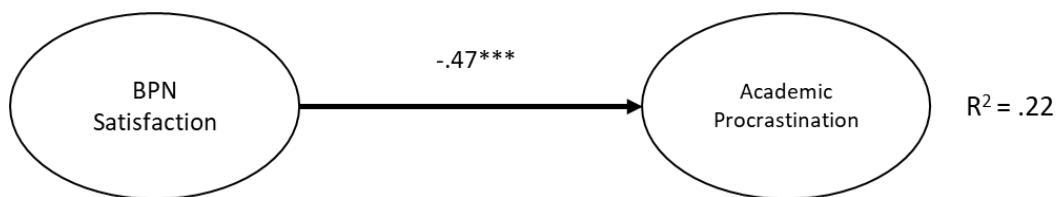
Structural Modeling¹

BPN Satisfaction

The proposed direct effects model is presented in Figure 4. BPN satisfaction was significantly and negatively associated with procrastination ($\beta = -.47, p \leq .001$). Figure 5 depicts the results from the structural mediation model with BPN satisfaction, autonomous motivation, controlled motivation, and amotivation, including their hypothesized paths and corresponding standardized estimates. The proposed model provided an acceptable fit: $\chi^2(197) = 2.34, p \leq .01$, CFI = .92, TLI = .91, RMSEA = .078, and SRMR = .11. Standardized factor loadings are presented in Table 6. The factor loadings of latent variables were within an acceptable range (Ertz et al., 2016).

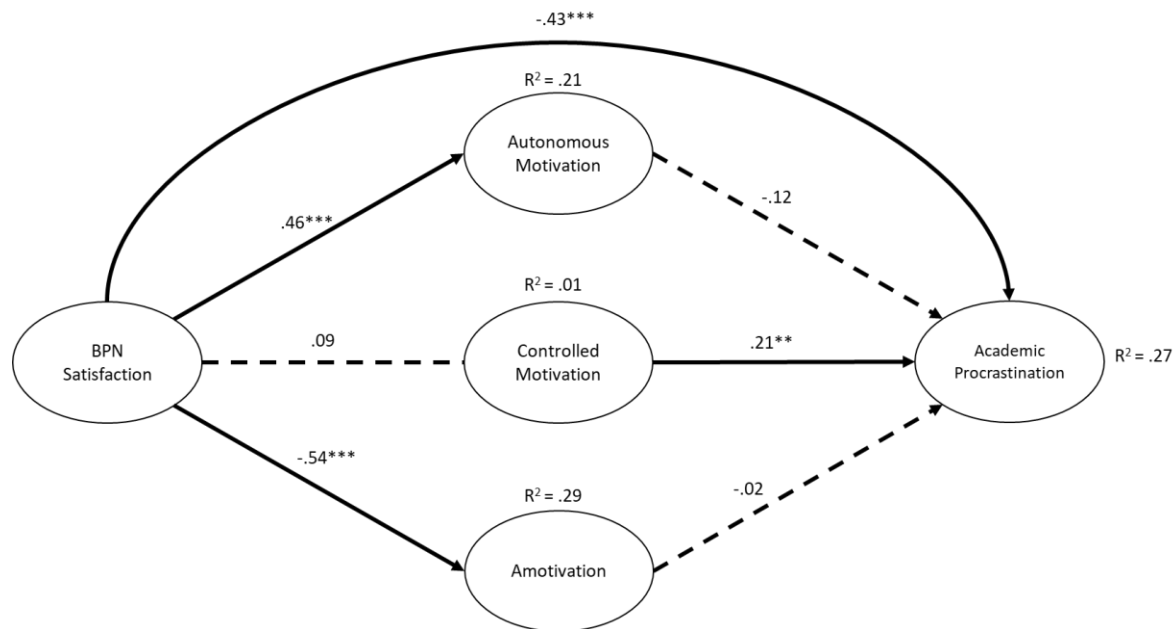
This model showed that BPN satisfaction was significantly and positively associated with autonomous motivation ($\beta = .46, p \leq .001$) and negatively with amotivation ($\beta = -.54, p \leq .001$). BPN satisfaction was not significantly associated with controlled motivation ($\beta = .09, p = .21$). Autonomous motivation ($\beta = -.12, p = .15$) and amotivation ($\beta = -.02, p = .88$) were not significantly associated with academic procrastination, whereas controlled motivation was ($\beta = .21, p \leq .05$).

¹ When a complete model was tested with both need satisfaction and need frustration, many of the significant motivation effects turned non-significant due to the strength of the relationship between need satisfaction and procrastination and need frustration and procrastination.

Figure 4.*Direct Effects Model with BPN Satisfaction*

Note. The direct effects model examining the relationship between BPN satisfaction and procrastination, prior to adding the mediators to the model ($p < .001^{**}$).

The standardized direct path from BPN satisfaction to procrastination was statistically significant after the mediators were included in the model ($\beta = -.43$, $p \leq .001$). The standardized indirect path of BPN satisfaction to procrastination was not statistically significant when considering all mediators ($\beta = -.03$, $p = .61$), indicating that autonomous and controlled motivation, and amotivation—altogether—do not play a significant role in the relationship between BPN satisfaction and procrastination. However, this is likely due to the indirect effect of autonomous motivation (negative) and amotivation (positive) cancelling each other out. Sobel tests were conducted for each mediator to examine the indirect effects individually. When examined independently, autonomous motivation ($z = -3.36$, $p \leq .001$) and amotivation ($z = 3.50$, $p \leq .001$) were significant mediators in the relationship between BPN satisfaction and procrastination. In total, the variables in this path model accounted for 27% of the variance in procrastination.

Figure 5.***Mediation Model with BPN Satisfaction***

Note. Structural mediation model. Solid lines represent statistically significant relationships ($p < .001^{***}$, $p < .01^{**}$). Dotted lines indicate non-significant relationships.

Table 6.***Latent Factor Loadings for BPN Satisfaction Mediation Model Parcels***

Parcel	Factor Loading
BPN SAT	
1	.84
2	.90
3	.82
Autonomous Motivation	
1	.85
2	.89
3	.89
4	.82
Controlled Motivation	
1	.64
2	.73

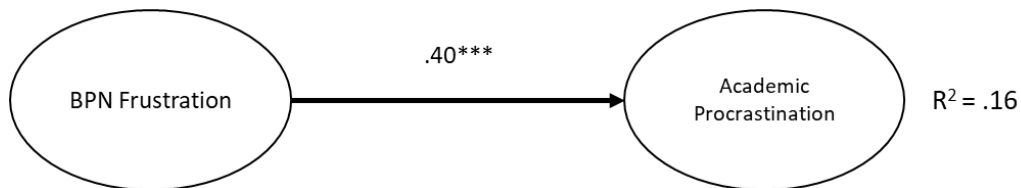
3	.85
4	.91
Amotivation	
1	.86
2	.71
3	.66
4	.77
Procrastination	
1	.78
2	.63
3	.61

BPN Frustration

Similarly to Oram and Rogers Study 1, we tested a model to determine whether autonomous motivation, controlled motivation, and amotivation would mediate the relationship between BPN frustration and procrastination. First, a direct effects model was tested (Figure 6). BPN frustration significantly and positively predicted procrastination ($\beta = .40, p \leq .001$).

Figure 6.

Direct Effects Model with BPN Frustration



Note. The direct effects model examining the relationship between BPN frustration and procrastination, prior to adding the mediators to the model ($p < .001^{**}$).

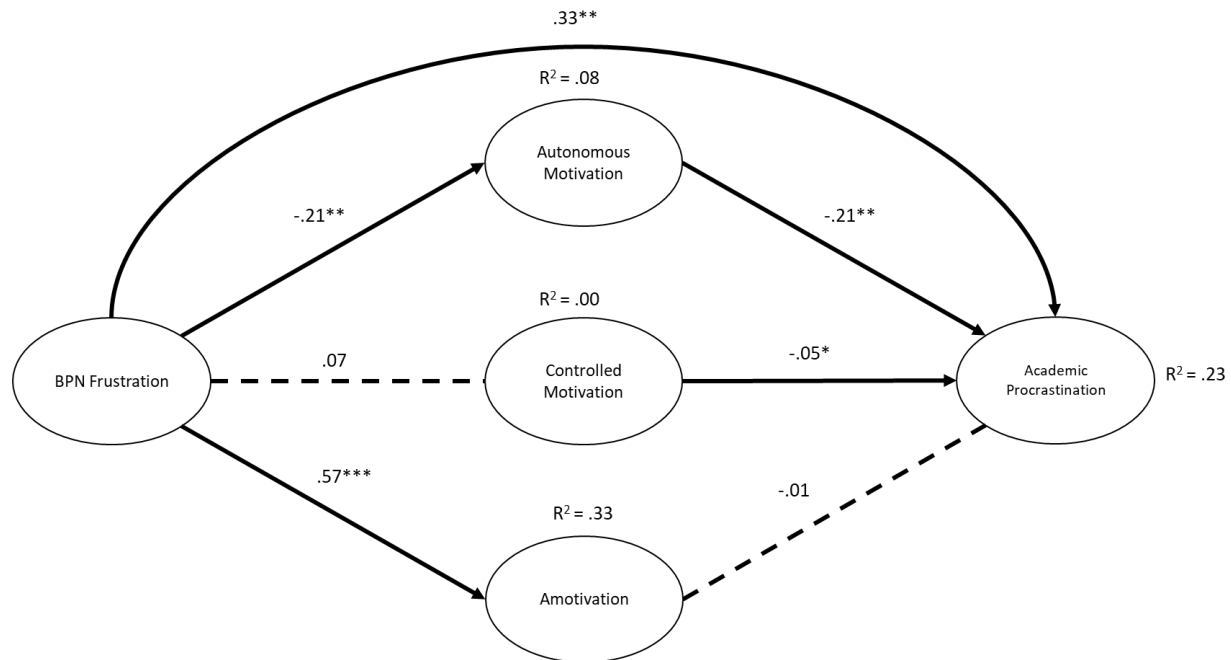
Figure 7 depicts the results from the structural mediation model with BPN frustration, autonomous motivation, controlled motivation, and amotivation, including their hypothesized paths and corresponding standardized estimates. The proposed model provided acceptable fit:

$\chi^2(197) = 2.43$ $p \leq .01$, CFI = .92, TLI = .90, RMSEA = .080, and SRMR = .13. All factor loadings for latent variables are presented in Table 7. The factor loadings were within an acceptable range.

This model showed that BPN frustration was significantly and negatively associated with autonomous motivation ($\beta = -.21$, $p \leq .01$) and positively associated with amotivation ($\beta = .57$, $p \leq .001$). BPN frustration was not significantly associated with controlled motivation ($\beta = .07$, $p = .89$). Autonomous motivation was negatively associated with procrastination ($\beta = -.21$, $p \leq .01$), whereas controlled motivation ($\beta = -.05$, $p > .05$) was positively associated with procrastination ($\beta = .18$, $p \leq .05$). Amotivation was not significantly associated with procrastination ($\beta = -.01$, $p = .96$).

Figure 7.

Mediation Model with BPN Frustration



Note. Structural mediation model. Solid lines represent statistically significant relationships ($p < .001^{***}$, $p < .01^{**}$, $p < .05^{*}$). Dotted lines indicate non-significant relationships.

The standardized direct path from BPN frustration to procrastination was statistically significant after the mediators were included in the model ($\beta = .33$, $p \leq .01$). The standardized indirect path of BPN frustration to procrastination was not statistically significant ($\beta = .07$, $p = .27$), indicating that autonomous and controlled motivation, and amotivation—together—do not play a significant role in the relationship between BPN frustration and procrastination. Sobel tests were conducted for each mediator to examine the indirect effects individually. When examined independently, autonomous motivation ($z = -2.59$, $p \leq .001$), controlled motivation ($z = 3.21$, $p \leq .001$), and amotivation ($z = 3.26$, $p \leq .001$) were significant mediators between BPN frustration and procrastination. In total, the variables in this path model accounted for 22% of the variance in procrastination.

Table 7.

Factor Loadings for BPN Frustration Mediation Model Parcels

Parcel	Factor Loading
BPN FRUS	
1	.81
2	.88
3	.84
Autonomous Motivation	
1	.67
2	.79
3	.79
4	.72
Controlled Motivation	
1	.65
2	.73
3	.86
4	.91
Amotivation	

1	.88
2	.70
3	.66
4	.77
Procrastination	
1	.78
2	.63
3	.61

Discussion

The current study's main goal was to develop, implement, and test the efficacy of an SDT-and MI-based group intervention. Although we ultimately aimed to reduce procrastination with this intervention, the goal of this study extended beyond this individual outcome. From a theoretical perspective, this intervention examined whether MI-based techniques would be effective in targeting SDT variables such as BPN satisfaction and frustration, leading to increased autonomous motivation and decreased controlled motivation, amotivation, and procrastination. We also aimed to replicate results from our previous study (i.e., Study 1) to provide further evidence of these variables' relationships. From a practical perspective, we aimed to create and test a brief, cost-effective group intervention that could be easily disseminated across university campuses to impact academic procrastination. Although not all our hypotheses were supported, these findings contribute significantly to the current SDT, motivation, procrastination, and MI literature.

Intervention Outcomes

BPN Satisfaction

As hypothesized, participants in the INT group experienced significant increases in their BPN satisfaction compared to the CON group. The effects of the intervention were small in size but large in implication. Although there have been previous interventions that have successfully

integrated SDT and MI—and had significant impacts on need satisfaction—these studies were conducted in the context of physical activity (Fortier et al., 2007; Van Hoecke et al., 2013). However, there were similarities in the approach used in these interventions and the current study, despite being in different domains. For example, Fortier et al. (2007) emphasized expressing empathy, providing encouragement, avoiding judgment, and patience in decision-making and solution-finding to foster autonomous motivation and perceived competence. Van Hoecke et al. (2013) focused on facilitating rather than prescribing or providing positive feedback, and expressing empathy through active listening. Given that our workshop embraced these techniques and seemingly provided an autonomy-supportive environment, it is not surprising that the results resembled those of previous studies in that we were successful in providing a need supportive environment that fostered BPN satisfaction.

When a more fine-grained analysis was conducted, we found that competence satisfaction increased significantly between T1 and T2 for the INT group. This finding reflects increases in participants' competence in their academic capabilities, including their ability to complete difficult academic tasks and achieve their academic goals. There are various techniques used in the intervention that may have contributed to these significant increases in competence satisfaction, specifically. For example, identifying past successes and strengths supports and fosters competence, which significantly contributes to change (Frey et al., 2011; Miller & Rollnick, 2013). Moreover, the facilitator provided affirmations and positive feedback throughout the workshop that focused on the participants' skills and strengths. For example, if a participant discussed a time they did not procrastinate and mentioned a specific strategy, the facilitator would affirm a strength related to that skill (e.g., turning their phone off demonstrates self-control). It was important for the facilitator to provide encouragement and support in the

context of challenging tasks (e.g., overcoming procrastination-related barriers), as competence satisfaction is more associated with the intrinsic satisfaction a person feels when they can effectively meet a challenge (Ryan & Moller, 2017).

Perceived academic competence has been positively associated with students' study strategies, learning approach, and academic performance (Ferla et al., 2010; Lieu et al., 2015; Loeb & Hurd, 2019). Similarly, competence satisfaction has been shown to predict students' learning strategies, mastery goals, motivation to learn, positive and negative affect, and overall well-being (Cho et al., 2015; Diseth et al., 2012; Levesque et al., 2004; Mouratidis et al., 2013). Previous studies have found that competence satisfaction can play a significant role in motivation and other positive academic outcomes (Hondrich et al., 2018; Lieu et al., 2015). Moreover, increases in perceived competence may initiate a transition from a fixed to a growth mindset. If students are more confident in their abilities, they are more likely to see struggle or failure as an opportunity to learn and grow (Walton & Wilson, 2018). However, SDT research suggests that competence satisfaction is not enough to facilitate more autonomous motivation (Ryan & Moller, 2017). This may explain our lack of significant changes in autonomous motivation.

Although non-significant, the examination of means for autonomy satisfaction suggested increases for the INT group, as well as a potential interaction according to the plot. Despite not being large enough to produce a significant interaction effect, the small, significant increase between T1 and T2 for the INT group may suggest a positive, upwards trend that could have been impacted with a longer intervention or captured by a follow-up. Results did not suggest any trends for relatedness satisfaction. Given that group MI can increase a sense of community among participants (Wagner & Ingersoll, 2013), this was somewhat surprising.

BPN Frustration

Our results suggested that the INT group experienced significant decreases in their BPN frustration scores from T1 to T2, whereas the control group did not. However, there was not a significant interaction between time and condition. Despite the lack of interaction, this finding may be related to the significant effect on basic psychological need satisfaction. Given that the intervention increased the participants' perceptions of basic psychological need satisfaction, participants' may have perceived the frustration of their needs as lower after the intervention. As previously stated, the intervention sought to provide an autonomy-supportive environment which should reduce need frustration.

Motivation

Contrary to previous MI interventions in the health domain, we did not see significant increases in autonomous motivation despite increases in BPN satisfaction (Fortier et al., 2007; Van Hoecke et al., 2013). However, previous interventions took place over a significantly longer period (e.g., one year; Van Hoecke, et al., 2013) compared to the current study. Moreover, interventions in the health domain typically focus on one specific behaviour (e.g., physical activity) rather than healthy behaviours in general. The specificity hypothesis posits that situational motivation towards a specific activity should be mainly influenced by contextual motivation, rather than contextual motivation towards a non-related activity (Ntoumanis & Blaymires, 2003). In other words, it is incorrect to assume that increasing levels of academic motivation, in general, would have significant impacts on autonomous motivation in a specific course where the student is struggling with their motivation. Therefore, it may have been more advantageous to target autonomous motivation in a specific course or task rather than academic motivation as a whole.

As previously mentioned, our intervention only increased competence satisfaction significantly, whereas previous interventions increased BPN satisfaction holistically. SDT posits that competence is not enough to produce high-quality or autonomous motivation (Ryan & Moller, 2017). Moreover, although competence is necessary for any type of motivation, autonomy satisfaction is necessary for the motivation to be autonomous (Deci & Ryan, 2000). Because our intervention did not significantly increase both competence and autonomy satisfaction simultaneously, it may explain why we did not see significant increases in autonomous motivation in the INT group. Examination of autonomous motivation means did suggest small increases in autonomous motivation for the INT group; however, these also occurred naturally in the CON group. Given that autonomous satisfaction increased in the right direction, we may have seen significant increases in autonomous motivation at follow-up.

There were no significant effects of time, condition, or time and condition on amotivation. Amotivation was low in both groups at T1 compared to autonomous and controlled motivation. Changes in amotivation may not have occurred due to the low prevalence of amotivation in participants in both experimental conditions.

Procrastination

There was no effect of the intervention on procrastination. There are several potential explanations for this finding. First, it may be due to the lack of significant increases across all BPN. Although the workshop increased BPN satisfaction, this was likely due to the significant increase in competence satisfaction. As previously stated, competence satisfaction is not enough to facilitate more autonomous motivation; therefore, it may not have been enough to reduce procrastination during the workshop's duration (Ryan & Moller, 2017). Given that the direct and indirect pathways of BPN satisfaction to procrastination may have lacked the strength necessary

to impact procrastination, it is not surprising that we did not see any reductions. These findings do not necessarily allude to the ineffectiveness of SDT as a theoretical framework or MI strategies; rather, they suggest that more research is needed to determine whether these variables are impacted over longer periods.

Second, we may not have seen immediate effects of the workshop on motivation and procrastination, as it takes time for cognitive changes to translate into behavioural changes (i.e., a reduction in procrastination behaviours). According to the transtheoretical model of change, individuals must go through several stages before achieving complete change (Prochaska et al., 2008). Although BPN satisfaction may have moved participants closer to a later stage of change (e.g., from precontemplation to contemplation), participants may not have moved into the action stage until after the study period. Future research should aim to investigate further stages of change in the context of procrastination interventions.

Third, research suggests that interventions using CBT techniques have generally been effective (Rozental et al., 2018). However, these positive effects may be the result of the intensity of the intervention, which is not necessarily feasible on a large scale for post-secondary institutions (Van Eerde & Klingsieck, 2018). Furthermore, many CBT studies used other techniques or strategies to reduce procrastination, such as time-management or goal-setting (Van Eerde & Klingsieck, 2018; Toker & Avci, 2015). Although using a combination of theoretical and practical strategies can increase the intervention's impacts, it also increases the difficulty of distilling the effects of each strategy. On the other hand, our study solely focused on the use of MI strategies as a means of testing a variety of theoretical and practical implications. This may have reduced our ability to have substantial impacts on procrastination. Future iterations of this study may want to use a combination of strategies to target procrastination to increase the

impact. However, this approach will require transparent and detailed descriptions of the different techniques used, as well as analysis comparisons of the different techniques against the combined approach (e.g., a variety of INT conditions).

Wise interventions are becoming the “gold standard” for post-secondary interventions due to their effectiveness in helping people make lasting changes in short periods (Walton & Yeager, 2020). Wise interventions involve using theory- and research-based techniques to address a variety of psychological barriers across contexts. Similarly to MI, wise interventions are not directive. They aim to provide people with the opportunity to draw their own conclusions about their behaviours and how to change. These interventions can include various techniques, including value-affirmation exercises, providing information, and active reflection exercises (Walton & Wilson, 2018).

According to wise intervention literature, the social context must be aligned with the adaptive mindset fostered in an intervention; otherwise, the intervention may not have significant or lasting effects (Walton & Yeager, 2020; Yeager et al., 2019). In the context of our intervention, it may be that the university in which this intervention took place does not foster the adaptive way of thinking needed for this intervention to affect procrastination. It is well-established that the post-secondary climate can be stressful and involve excessive personal control, unsustainable demands, and unreasonable expectations of high productivity and performance (McAuliffe et al., 2019; Linden & Stuart, 2020). This can lead to feelings of academic disaffection, disengagement, lower need satisfaction and even need frustration (Long, 1982; Codina et al., 2018). Therefore, it may be necessary for the post-secondary climate to change before some interventions can have lasting effects on procrastination. As long as post-

secondary institutions do not satisfy the BPN of their students, procrastination will persist within the undergraduate population.

Finally, some methodological limitations may have played a significant role in our ability to reduce procrastination significantly. The most substantial methodological limitation of the current study was the low response rate for the follow-up questionnaire and the subsequent inability to analyze it. The follow-up questionnaire may have allowed us to see any lagging changes in motivation and procrastination variables. Unfortunately, the university's research pool limited our ability to make the follow-up questionnaire a requirement for study completion. For this reason, the follow-up remained voluntary. Future research should ensure follow-ups are a requirement or use other techniques to ensure a more substantial response rate (e.g., higher monetary compensation).

The brief nature of the workshop may have also contributed to the lack of effects on procrastination. The workshops may not have had significant effects on more distal factors—such as motivation and procrastination—due to its short duration (i.e., three weeks). Although previous studies have found results after short MI workshops (D'Amico et al., 2007; Hawkins et al., 2016; Reich et al., 2015), MI literature posits that longer exposure to MI increases the likelihood of impact and behaviour change (Wagner & Ingersoll, 2013). Given that procrastination may be a more difficult behaviour to change, it might have been beneficial to increase the workshop's duration. Future studies should aim to increase the intervention duration to determine whether this increases the likelihood of significant impacts on procrastination.

Theoretical Modelling

In this study, we aimed to replicate the findings of Study 1. Similarly to Study 1, the BPN satisfaction model suggested a significant, direct relationship between BPN satisfaction and procrastination. Our results also suggested significant relationships between BPN satisfaction, autonomous motivation, and amotivation. In contrast to Study 1, however, BPN satisfaction was not significantly associated with controlled motivation. Moreover, controlled motivation was the only mediator significantly associated with academic procrastination. The lack of significant associations between autonomous motivation, amotivation, and academic procrastination in the model was surprising, given the significant correlations at time 1, associations between these variables in the previous study (Study 1), and across the literature (Cavusoglu & Karatas, 2015). However, compared to other studies, this study's sample size was significantly smaller and may have influenced the results obtained in this model.

Sobel tests did suggest that autonomous motivation and amotivation were significant mediators when examined individually. However, Sobel tests assume normality in product estimators—which are typically not normal—and can result in potentially inaccurate *p* values, particularly in smaller samples (Kline, 2016). For this reason, the results of the Sobel tests must be interpreted cautiously.

On the other hand, the results from the current study's model examining BPN frustration mostly replicated the previous study results. Both studies found a significant association between BPN frustration and academic procrastination, which was not mediated by the different types of academic motivation. In contrast to the previous study, however, Sobel tests suggested that each of the mediators was significant when examined individually. Although the current study's mediation results differed from Study 1, the relationships between BPN satisfaction, BPN frustration, and academic procrastination were consistent in both studies. Because of the

discrepancies between the two studies' results, future research should aim to re-test these models with a larger intervention sample to examine the relationships over time.

Although academic motivation played a modest role in both models, it appeared that need satisfaction and frustration played a larger role, as the significance of the direct effects remained after motivation mediators were included in the models. This could have implications for the design and focus of future procrastination interventions, as focusing on motivation or other person-centred approaches may not be sufficient to produce change.

Implications

Both the significant and non-significant findings of this study have important theoretical and practical implications. The intervention outcomes demonstrated the compatibility of SDT and MI, in that MI strategies were successful in targeting BPN satisfaction—particularly competence satisfaction—in the academic domain. This may be related to MI's effectiveness in providing autonomy support and creating an autonomy-supportive, therapeutic environment (Resnicow & McMaster, 2012). This approach could be translated into the classroom as a way of increasing BPN satisfaction on a larger scale. For example, professors can reduce pressure by allowing students a choice in their evaluation (e.g., options for papers versus exams), providing positive and useful feedback on assignments, and creating an empathic and understanding environment through positive interactions and demeanour (Friederichs et al., 2016; Leveseque-Bristol et al., 2019). Given the potential of MI in the context of SDT demonstrated in this study, future SDT interventions and approaches may want to consider the use of MI strategies as a more evidence-based and consistent means of targeting BPN.

This study also has important implications for student mental health, as increasing BPN satisfaction in the student population may be a strategy to address the mental health crises occurring across post-secondary campuses (Xiao et al., 2017). Because BPN satisfaction has been associated with subjective well-being, the use of MI strategies by professors and administrative staff (e.g., academic advisors) may increase BPN satisfaction in the academic domain and, thus, may positively impact students' overall well-being. Furthermore, subjective well-being is a well-established predictor of longitudinal academic outcomes (Suldo et al., 2011); therefore, increasing BPN satisfaction may result in positive academic outcomes.

Although the current study did not demonstrate the impacts of BPN satisfaction on motivation or procrastination in the intervention context, the direction of the relationships among the variables was consistent with previous studies (Cavusoglu & Karatas, 2015; Study 1). For example, in the current study, BPN satisfaction was significantly positively associated with autonomous motivation and significantly negatively associated with procrastination. Future studies should aim to conduct longitudinal analyses to determine the relationships between these variables over time and determine at what level BPN satisfaction begins to impact motivation, and subsequently, procrastination.

Our theoretical modelling results replicated some of the findings from the previous study (Study 1); however, there were significant differences (i.e., the relationships between academic motivation and procrastination) that must be examined in future research. Future studies should also aim to clarify the role of need satisfaction and frustration on procrastination over and above motivation.

Limitations and Strengths

Despite the important implications of the current study, some limitations should be considered. The instructions given to the participants when completing the post-questionnaire may have limited the effects in the study. For example, in the BPNFS, participants were asked to reflect on the items over four weeks. Therefore, there would have been an overlap with the pre-intervention period. In other questionnaires, the instructions were vague. Future studies should ensure that time points do not overlap.

In terms of experimental design, the wait-list control group was a potential limitation. Wait-list control groups are no longer favoured in randomized controlled designs as they may overestimate intervention effects (Cunningham et al., 2013). Although we did encourage control participants to seek out treatment from the various university resources, future research should employ an active control group design (Kinser & Robins, 2013).

Additionally, there may have been timing effects related to the time of year. Participants were recruited across the entire academic year. Therefore, there may have been differences between those recruited in the fall versus winter semesters. For example, students may have done poorly in the fall semester and become more or less motivated to change their behaviour in the winter semester. Future research should examine these differences to determine whether the INT effects would differ depending on the semester they were recruited.

There are also theoretical limitations that must be considered. First, there is a wide variety of variables that may play a role in motivation and procrastination. Because we wanted to focus specifically on the relationship between BPN, motivation, and procrastination, we did not measure variables such as current mental illness. Future studies should aim to examine or control for this variable to determine whether BPN satisfaction plays a significant role in motivation and procrastination, regardless of mental illness. Additionally, MI and SDT define intrinsic

motivation differently and, thus, MI strategies may not target autonomous motivations. For example, MI research maintains that MI's goal is to increase intrinsic motivation for change (Miller & Rollnick, 2013); however, SDT defines intrinsic motivation as engaging in activity for enjoyment. This definition would imply that MI may not be targeting intrinsic motivations; rather, it facilitates internalizing more controlled motivations (Patrick & Williams, 2012). This may have explained the non-significant increases in autonomous and controlled motivation in the INT group.

Despite the limitations above, this study had several considerable strengths that improved upon previous procrastination interventions. For example, we employed a rigorous scientific design by using a randomized control trial and a follow-up measure that resulted in small but significant effect sizes. Small effect sizes should not be dismissed, as they can have large consequences in intervention research (Lakens, 2013). Our intervention was sufficiently powered, as the number of participants to obtain appropriate power was calculated before beginning the study, with attrition in mind. Both the sampling and intervention procedures are well-documented and transparent, allowing for replication and improvement of the study. Additionally, the workshop was cost-effective, as it was distributed in a group format over a short period. Finally, our study was both theory- and evidence-based, thereby addressing a significant limitation of previous interventions (Van Eerde & Klingiseck, 2018).

Conclusion

The current study provided preliminary evidence for the effectiveness of a brief, cost-effective workshop that used MI-based strategies to target BPN satisfaction. Although we were unsuccessful in changing students' motivations and procrastination behaviours over the workshop's short duration, the current study provided important insights and directions for future

procrastination interventions based on SDT and MI. Moreover, this intervention may inform techniques that could be used across post-secondary institutions by professors and administrative staff to increase BPN satisfaction, which has been widely associated with positive academic and mental health outcomes.

References

- Ackerman, D. S., & Gross, B. L. (2005). My instructor made me do it: Task characteristics of procrastination. *Journal of Marketing Education*, 27(1), 5-13.
<https://doi.org/10.1177/0273475304273842>
- Adie, J. W., Duda, J. L., & Ntoumanis, N. (2008). Autonomy support, basic need satisfaction, and the optimal functioning of adult male and female sport participants: A test of basic

- needs theory. *Motivation and Emotion*, 32, 189–199. <https://doi.org/10.1007/s11031-008-9095-z>
- Akbay, S.E. & Gizir, C.A. (2010). Academic postponement behavior in university students by gender: Role of academic motivation, academic self-efficacy academic uploading styles. *Mersin University Journal of Faculty of Education*, 6(1), 60-78.
- Akpur, U., & Yurtseven, N. (2019). Structural relationships between academic motivation, procrastination and perfectionism: A modelling study. *Cumhuriyet International Journal of Education*, 8(1), 95-112. <https://doi.org/10.30703/cije.452633>
- Balkis, M., & Duru, E. (2016). Procrastination, self-regulation failure, academic life satisfaction, and affective well-being: Underregulation or misregulation form. *European Journal of Psychology of Education*, 31, 439-459. <https://doi.org/10.1007/s10212-015-0266-5>
- Batool, S. S., Khursheed, S., & Jahangir, H. (2017). Academic procrastination as a product of low self-esteem: A mediational role of academic self-efficacy. *Pakistan Journal of Psychological Research*, 32(1), 195-211.
- Black, A. E., & Deci, E. L. (2000). The effects of instructors' autonomy support and students' autonomous motivation on learning organic chemistry: A self-determination theory perspective. *Science Education*, 84(6), 740–756. [https://doi.org/10.1002/1098-237X\(200011\)84:6<740::AID-SCE4>3.0.CO;2-3](https://doi.org/10.1002/1098-237X(200011)84:6<740::AID-SCE4>3.0.CO;2-3)
- Blouin-Hudon, E. C., & Pychyl, T. A. (2017). A mental imagery intervention to increase future self-continuity and reduce procrastination. *Applied Psychology*, 66(2), 326-352. <https://doi.org/10.1111/apps.12088>
- Burka, J. B., & Yuen, L. (2008). *Procrastination: Why you do it; What to do about it NOW* (2nd ed.). Cambridge: Da Capo Press.

- Byiers, B. J., Reichle, J., & Symons, F. J. (2012). Single-subject experimental design for evidence-based practice. *American Journal of Speech-Language Pathology*, 21(4), 397-414. [https://doi.org/10.1044/1058-0360\(2012/11-0036\)](https://doi.org/10.1044/1058-0360(2012/11-0036))
- Cavusoglu, C., & Karatas, H. (2015). Academic procrastination of undergraduates: Self-determination theory and academic motivation. *The Anthropologist*, 20(3), 735-743. <https://doi.org/10.1080/09720073.2015.11891780>
- Chan, D. K. C., Zhang, L., Lee, A. S. Y., & Hagger, M. S. (2020). Reciprocal relations between autonomous motivation from self-determination theory and social cognition constructs from the theory of planned behavior: A cross-lagged panel design in sport injury prevention. *Psychology of Sport and Exercise*, 48, Advanced online publication. doi:10.1016/j.psychsport.2020.101660
- Chang, Y., Chen, S., Tu, K., & Chi, L. (2016). Effect of autonomy support on self-determined motivation in elementary physical education. *Journal of Sports Science & Medicine*, 15(3), 460-466.
- Chen, B., Vansteenkiste, M., Beyers, W., Boone, L., Deci, E. L., van der Kaap-Deeder, J., Duriez, B., Lens, W., Matos, L., Mouratidis, A., Ryan, R. M., Sheldon, K. M., Soenens, B., Petegem, S. V., & Verstuyf, J. (2015). Basic psychological need satisfaction, need frustration, and need strength across four cultures. *Motivation and Emotion*, 39(2), 216-236. <https://doi.org/10.1007/s11031-014-9450-1>
- Cho, Y., Harrist, S., Steele, M., & Murn, L. T. (2015). College student motivation to lead in relation to basic psychological need satisfaction and leadership self-efficacy. *Journal of College Student Development*, 56(1), 32-44. <https://doi.org/10.1353/csd.2015.0005>

- Chu, A. H. C., & Choi, J. N. (2005). Rethinking procrastination: Positive effects of “active” procrastination behavior on attitudes and performance. *The Journal of Social Psychology, 145*(3), 245-264. <https://doi.org/10.3200/SOCP.145.3.245-264>
- Cordeiro, P. M. G., Paixão, M. P., Lens, W., Lacante, M., & Luyckx, K. (2018). Parenting styles, identity development, and adjustment in career transitions: The mediating role of psychological needs. *Journal of Career Development, 45*(1), 83-97. <https://doi.org/10.1177/0894845316672742>
- Cunningham, J. A., Kypri, K., & McCambridge, J. (2013). Exploratory randomized controlled trial evaluating the impact of a waiting list control design. *BMC Medical Research Methodology, 13*:150, <https://doi.org/10.1186/1471-2288-13-150>
- D’Amico, E. J., Miles, J. N. V., Stern, S. A., & Meredith, L. S. (2007). Brief motivational interviewing for teens at risk of substance use consequences: A randomized pilot study in a primary care clinic. *Journal of Substance Abuse Treatment, 35*(1), 53-61. <https://doi.org/10.1016/j.jsat.2007.08.008>
- Deci, E., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. Plenum Press.
- Deci, E., & Ryan, R. M. (2000). The “what” and “why” of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11*(4), 227-268. https://doi.org/10.1207/S15327965PLI1104_01
- Demir, Y., & Kutlu, M. (2018). Relationships among Internet addiction, academic motivation, academic procrastination, and school attachment in adolescents. *International Online Journal of Educational Sciences, 10*(5), 315-332. <https://doi.org/10.15345/iojes.2018.05.020>

- Diseth, Å., Danielsen, A. G., & Samdal, O. (2012). A path analysis of basic need support, self-efficacy, achievement goals, life satisfaction and academic achievement level among secondary school students. *Educational Psychology, 32*(3), 335–354. <https://doi.org/10.1080/01443410.2012.657159>
- Duda, J. L., Williams, G. C., Ntoumanis, N., Daley, A., Eves, F. F., Mutrie, N., Rouse, P. C., Lodhia, R., Blamey, R. V., & Jolly, K. (2014). Effects of a standard provision versus an autonomy supportive exercise referral programme on physical activity, quality of life and well-being indicators: A cluster randomised controlled trial. *International Journal of Behavioral Nutrition and Physical Activity, 11*(10). <https://doi.org/10.1186/1479-5868-11-10>
- Eckert, M., Ebert, D. D., Lehr, D., Sieland, B., & Berking, M. (2016). Overcome procrastination: Enhancing emotion regulation skills reduce procrastination. *Learning and Individual Differences, 52*, 10-18. <https://doi.org/10.1016/j.lindif.2016.10.001>
- Ertz, M., Karakas, F., & Sarigöllü, E. (2016). Exploring pro-environmental behaviors of consumers: An analysis of contextual factors, attitude, and behaviors. *Journal of Business Research, 69*(10), 3971-3980. doi:10.1016/j.jbusres.2016.06.010
- Essau, C.A., Ederer, E.M., O'Callaghan, J., & Aschemann, B. (2008, Oct. 2-4.). *Doing it now or later? Correlates, predictors and prevention of academic, decisional and general procrastination among students in Austria*. [Poster Presentation]. *The 8th Alps-Adria Psychology Conference*, Ljubljana, Slovenia.
- Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods, 39*(2), 175–191. <https://doi.org/10.3758/BF03193146>

- Ferla, J., Valcke, M. & Schuyten, G. (2010). Judgments of self-perceived academic competence and their differential impact on students' achievement motivation, learning approach, and academic performance. *European Journal of Psychology of Education*, 25, 519–536. <https://doi.org/10.1007/s10212-010-0030-9>
- Ferrari, J. R., & Scher, S. J. (2000). Toward an understanding of academic and nonacademic tasks procrastinated by students: The use of daily logs. *Psychology in the Schools*, 37(4), 359–366. [https://doi.org/10.1002/1520-6807\(200007\)37:4<367::AID-PITS7>3.0.CO;2-Y](https://doi.org/10.1002/1520-6807(200007)37:4<367::AID-PITS7>3.0.CO;2-Y)
- Flett, G. L., Hewitt, P. L., Stainton, M., & Sherry, S. B. (2012). Procrastination automatic thoughts as personality construct: An analysis of the procrastinatory cognitions inventory. *Journal of Rational-Emotive and Cognitive-Behavior Therapy*, 30(4), 233-236. <https://doi.org/10.1007/s10942-012-0150-z>
- Foot, J., DeLuca, A., Magura, S., Warner, A., Grand, A., Rosenblum, A., & Stahl, S. (1999). A group motivational treatment for chemical dependency. *Journal of Substance Abuse Treatment*, 17(3), 181-192. [https://doi.org/10.1016/S0740-5472\(99\)00003-3](https://doi.org/10.1016/S0740-5472(99)00003-3)
- Fortier, M. S., Hogg, W., O'Sullivan, T. L., Blanchard, C., Reid, R. D., Sigal, R. J., Boulay, P., Doucet, E., Sweet, S., Bisson, E., & Beaulac, J. (2007). The physical activity counselling (PAC) randomized controlled trial: Rationale, methods, and interventions. *Applied Physiology, Nutrition, and Metabolism*, 32(6), 1170-1185. <https://doi.org/10.1139/H07-075>
- Fortier, M. S., Sweet, S. N., O'Sullivan, T. L., & Williams, G. C. (2007). A self-determination process model of physical activity adoption in the context of a randomized controlled trial. *Psychology of Sport and Exercise*, 8(5), 741–757. <https://doi.org/10.1016/j.psychsport.2006.10.006>

- Frey, A. J., Cloud, R. N., Lee, J., Small, J. W., Seeley, J. R., Feil, E. G., Walker, H.M., & Golly, A. (2011). The promise of motivational interviewing in school mental health. *School Mental Health*, 3(1), 1-12. <https://doi.org/10.1007/s12310-010-9048-z>
- Friederichs, S. A. H., Oenema, A., Bolman, C., & Lechner, L. (2016). Motivational interviewing and self-determination theory in a web-based computer tailored physical activity intervention: A randomized controlled trial. *Psychology and Health*, 31(8), 907-930. <https://doi.org/10.1080/08870446.2016.1151018>
- Glick, D. M., & Orsillo, S. M. (2015). An investigation of the efficacy of acceptance-based behavioral therapy for academic procrastination. *Journal of Experimental Psychology: General*, 144(2), 400–409. <https://doi.org/10.1037/xge0000050>
- Green, L. (1982). Minority students' self-control of procrastination. *Journal of Counseling Psychology*, 29(6), 636–644. <https://doi.org/10.1037/0022-0167.29.6.636>
- Grund, A., & Fries, S. (2018). Understanding procrastination: A motivational approach. *Personality and Individual Differences*, 121, 120-130. <https://doi.org/10.1016/j.paid.2017.09.035>
- Grunschel, C., Patrzek, J., & Fries, S. (2013). Exploring reasons and consequences of academic procrastination: An interview study. *European Journal of Psychology of Education*, 28, 841-861. <https://doi.org/10.1007/s10212-012-0143-4>
- Grunschel, C., Patrzek, J., Klingsieck, K. B., & Fries, S. (2018). “I’ll stop procrastinating now!” Fostering specific processes of self-regulated learning to reduce academic procrastination. *Journal of Prevention & Intervention in the Community*, 46(2), 143-157. <https://doi.org/10.1080/10852352.2016.1198166>

- Gustavson, D. E., & Miyake, A. (2017). Academic procrastination and goal accomplishment: A combined experimental and individual differences investigation. *Learning and Individual Differences, 54*, 160-172. <https://doi.org/10.1016/j.lindif.2017.01.010>
- Häfner, A. Oberst, V. & Stock, A. (2014). Avoiding procrastination through time management: An experimental intervention study. *Educational Studies, 40*(3), 352-360. <https://doi.org/10.1080/03055698.2014.899487>
- Hagbin, M., McCaffrey, A., & Pychyl, T. A. (2012). The complexity of the relation between fear of failure and procrastination. *Journal of Rational-Emotive & Cognitive-Behavior Therapy, 30*(4), 249–263. <https://doi.org/10.1007/s10942-012-0153-9>
- Hardcastle, S. J., Fortier, M., Blake, N., & Hagger, M. S. (2017). Identifying content-based and relational techniques to change behaviour in motivational interviewing. *Health Psychology Review, 11*(1), 1-16. <https://doi.org/10.1080/17437199.2016.1190659>
- Hawkins, J. L., Bravo, P., Gobat, N., Rollnick, S., Jerzembek, G., Whitehead, S., Chanon, S., Kelson, M., Adams, O., & Murphy, S. (2016). Group motivational interviewing in schools: Development of a health promotion intervention. *Health Education Journal, 75*(5), 513-527. <https://doi.org/10.1177/0017896915606938>
- He, S. (2017). A multivariate investigation into academic procrastination of university students. *Open Journal of Social Sciences, 5*, 12-24. <https://doi.org/10.4236/jss.2017.510002>
- Höcker, A., Engberding, M., Haferkamp, R., & Rist, F. (2012). Wirksamkeit von Arbeitszeitrestriktion in der Prokrastinationsbehandlung. *Verhaltenstherapie, 22*(1), 9-16. <https://doi.org/10.1159/000334970>

- Hondrich, A. L., Decristan, J., Hertel, S., & Klieme, E. (2018). Formative assessment and intrinsic motivation: The mediating role of perceived competence. *Zeitschrift für Erziehungswissenschaft*, 21(4), 717-734. <https://doi.org/10.1007/s11618-018-0833-z>
- Katz, I., Eilott, K., & Nevo, N. (2014). "I'll do it later": Type of motivation, self-efficacy and homework procrastination. *Motivation and Emotion*, 38(1), 111-119. <https://doi.org/10.1007/s11031-013-9366-1>
- Kim, K. R., & Seo, E. H. (2015). The relationship between procrastination and academic performance: A meta-analysis. *Personality and Individual Differences*, 82, 26–33. <https://doi.org/10.1016/j.paid.2015.02.038>
- Kinser, P. A., & Robins, J. L. (2013). Control group design: Enhancing rigor in research of mind-body therapies for depression. *Evidence-Based Complementary and Alternative Medicine*, Article 140467. <https://doi.org/10.1155/2013/140467>
- Klassen, R., Krawchuk, L. L., Rajani, S. (2008). Academic procrastination of undergraduates: Low self-efficacy to self-regulate predicts higher levels of procrastination. *Contemporary Educational Psychology*, 33(4), 915-931. <https://doi.org/10.1016/j.cedpsych.2007.07.001>
- Kline, R. B. (2016). *Methodology in the social sciences. Principles and practice of structural equation modeling (4th ed.)*. Guilford Press.
- Klingsieck, K. B. (2013). Procrastination: When good things don't come to those who wait. *European Psychologist*, 18(1), 24–34. <https://doi.org/10.1027/1016-9040/a000138>
- Klingsieck, K. B., Grund, A., Schmid, S., & Fries, S. (2013). Why students procrastinate: A qualitative approach. *Journal of College Student Development*, 54(4), 397-412. <https://doi.org/10.1353/csd.2013.0060>

- Koestner, R., Ryan, R. M., Bernieri, F. J., & Holt, K. D. (1984). Setting limits on children's behavior: The differential effects of controlling vs. informational styles on intrinsic motivation and creativity. *Journal of Personality*, 52(3), 233-248.
<https://doi.org/10.1111/j.1467-6494.1984.tb00879.x>
- Lakens, D. (2013). Calculating and reporting effect sizes to facilitate cumulative science: a practical primer for t-tests and ANOVAs. *Frontiers in psychology*, 4, 863.
<https://doi.org/10.3389/fpsyg.2013.00863>
- Lee, D. G., Kelly, K. R., & Edwards, J. K. (2006). A closer look at the relationships among trait procrastination, neuroticism, and conscientiousness. *Personality and Individual Differences*, 40(1), 27–37. <https://doi.org/10.1016/j.paid.2005.05.010>
- Levesque-Bristol, C., Maybee, C., Parker, L. C., Zywicki, C., Connor, C., & Flierl, M. (2019). Shifting culture: Professional development through academic course transformation. *Change: The Magazine of Higher Learning*, 51(1), 35-41.
<https://doi.org/10.1080/00091383.2019.1547077>
- Levesque, C., Zuehlke, A. N., Stanek, L. R., & Ryan, R. M. (2004). Autonomy and competence in german and american university students: A comparative study based on self-determination theory. *Journal of Educational Psychology*, 96(1), 68–84. <https://doi.org/10.1037/0022-0663.96.1.68>
- Lincourt, P., Kuettel, T. J., & Bombardier, C. H. (2002). Motivational interviewing in a group setting with mandated clients: A pilot study. *Addictive Behaviors*, 27(3), 381–391. [https://doi.org/10.1016/S0306-4603\(01\)00179-4](https://doi.org/10.1016/S0306-4603(01)00179-4)

- Linden, B., & Stuart, H. (2020). Post-Secondary Stress and Mental Well-Being: A Scoping Review of the Academic Literature. *Canadian Journal of Community Mental Health*, 39(1), 1-32. <https://doi.org/10.7870/cjcmh-2020-002>
- Lindblom- Ylänne, S., Saariaho, E., Inkinen, M., Haarala-Muhonen, A., & Hailikari, T. (2015). Academic procrastinators, strategic delayers and something betwixt and between: An interview study. *Frontline Learning Research*, 3(2), 47-62. <https://doi.org/10.14786/flr.v3i2.154>
- Lieu, E. S. C., Ye, C. J., & Yeung, D. Y. (2015). Effects of approach to learning and self-perceived overall competence on academic performance of university students. *Learning and Individual Differences*, 39, 199-204. <https://doi.org/10.1016/j.lindif.2015.03.004>
- Loeb, E., & Hurd, N. M. (2019). Subjective social status, perceived academic competence, and academic achievement among underrepresented students. *Journal of College Student Retention: Research, Theory & Practice*, 21(2), 150-165. <https://doi.org/10.1177/1521025117696821>
- Loeffler, S. N., Stumpp, J., Grund, S., Limberger, M. F., & Ebner-Priemer, U. W. (2019). Fostering self-regulation to overcome academic procrastination using interactive ambulatory assessment. *Learning and Individual Differences*, 75, Article 101760. <https://doi.org/10.1016/j.lindif.2019.101760>
- Long, S. (1982). Educational disenchantment and the university student. *Higher Education*, 11(2), 221-235. <https://doi.org/10.1007/BF00139690>
- Macher, D., Paechter, M., Papousek, I., & Ruggeri, K. (2012). Statistics anxiety, trait anxiety, learning behavior, and academic performance. *European Journal of Psychology of Education*, 27, 483-498. <https://doi.org/10.1007/s10212-011-0090-5>

- Madson, M. B., Mohn, R. S., Zuckoff, A., Schumacher, J. A., Kogan, J., Hutchison, S., Magee, E., & Stein, B. (2013). Measuring client perceptions of motivational interviewing: factor analysis of the Client Evaluation of Motivational Interviewing scale. *Journal of Substance Abuse Treatment*, 44(3), 330-335. <https://doi.org/10.1016/j.jsat.2012.08.015>
- McAuliffe, C., Upshur, R., Sellen, D.W. & Di Ruggiero, E. (2019). Critical Reflections on Mental Well-being for Post-Secondary Students Participating in the Field of Global Health. *International Journal of Mental Health Addiction* 17, 542–554. <https://doi.org/10.1007/s11469-018-0007-5>
- McFadden, T., Fortier, M. S., & Guérin, E. (2017). Investigating the effects of Physical Activity Counselling on depressive symptoms and physical activity in female undergraduate students with depression: A multiple baseline single-subject design. *Mental Health and Physical Activity*, 12, 25-36. <https://doi.org/10.1016/j.mhpa.2017.01.002>
- Mendel, E., & Hipkins, J. (2002). Motivating learning disabled offenders with alcohol-related problems: A pilot study. *British Journal of Learning Disabilities*, 30(4), 153-158. <https://doi.org/10.1046/j.1468-3156.2002.00209.x>
- Miller, W. R., & Rollnick, S. (2013). *Motivational interviewing: Helping people change (3rd ed.)*. Guilford Press.
- Moradi, M. (2015). Examining the effectiveness of training assertiveness skill on self-efficacy and procrastination of the female seventh grade junior students, district 19, Tehran: the educational year of 2014-2015. *International Letters of Social and Humanistic Sciences*, 57, 110-117. <https://doi.org/10.18052/www.scipress.com/ILSHS.57.110>
- Mouratidis, A., Vansteenkiste, M., Michou, A., & Lens, W. (2013). Perceived structure and achievement goals as predictors of students' self-regulated learning and affect and the

- mediating role of competence need satisfaction. *Learning and Individual Differences*, 23(1), 179-186. <https://doi.org/10.1016/j.lindif.2012.09.001>
- Moyers, T.B., Manuel, J.K., & Ernst, D. (2014). *Motivational Interviewing Treatment Integrity Coding manual 4.2.1 (MITI 4.2.1)* [Unpublished manual]. University of New Mexico.
- Mühlberger, M. D., & Traut-Mattausch, E. (2015). Leading to effectiveness: Comparing dyadic coaching and group coaching. *Journal of Applied Behavioral Science*, 51(2), 198–230. <https://doi.org/10.1177/0021886315574331>
- Murphy, R. T., Rosen, C. S., Cameron, R. P., & Thompson, K. E. (2002). Development of a group treatment for enhancing motivation to change PTSD symptoms. *Cognitive and Behavioral Practice*, 9(4), 308-316. [https://doi.org/10.1016/S1077-7229\(02\)80025-6](https://doi.org/10.1016/S1077-7229(02)80025-6)
- Nordby, K., Klingsieck, K. B. & Svartdal, F. (2017). Do procrastination-friendly environments make students delay unnecessarily?. *Social Psychology of Education*, 20, 491–512. <https://doi.org/10.1007/s11218-017-9386-x>
- Ntoumanis, N., & Blaymires, G. (2003). Contextual and situational motivation in education: A _____ test of the specificity hypothesis. *European Physical Education Review*, 9(1), 5-21. https://www.researchgate.net/profile/Nikos_Ntoumanis/publication/228978001_Contextual_and_Situational_Motivation_in_Education_A_Test_of_the_Specificity_Hypothesis/links/0fcfd506c28a98d934000000/Contextual-and-Situational-Motivation-in-Education-A-Test-of-the-Specificity-Hypothesis.pdf
- Ozer, B. U., Demir, A., & Ferrari, J. R. (2013). Reducing academic procrastination through a group treatment program: A pilot study. *Journal of Rational-Emotive and Cognitive-Behavior Therapy*, 31(3), 127-135. <https://doi.org/10.1007/s10942-013-0165-0>

- Patrick, H., & Williams, G. C. (2012). Self-determination theory: Its application to health behavior and complementarity with motivational interviewing. *International Journal of Behavioral Nutrition and Physical Activity*, 9:18. <https://doi.org/10.1186/1479-5868-9-18>
- Perrin, C. J., Miller, N., Haberlin, A. T., Ivy, J. W., Meindl, J. N., & Neef, N. A. (2011). Measuring and reducing college students' procrastination. *Journal of Applied Behavior Analysis*, 44(3), 463-474. <https://doi.org/10.1901/jaba.2011.44-463>
- Popoola, B. I. (2005). A study of procrastinatory behaviour and academic performance of undergraduate students in South Western Nigeria. *Journal of Social Sciences*, 11(3), 215-218. <https://doi.org/10.1080/09718923.2005.11892516>
- Prochaska, J. O., Redding, C. A., & Evers, K. E. (2008). *The transtheoretical model and stages of change*. In K. Glanz, B. K. Rimer, & K. Viswanath (Eds.), *Health behavior and health education: Theory, research, and practice* (pp. 97–121). Jossey-Bass.
- Pychyl, T. A., Lee, J. M., Thibodeau, R., & Blunt, A. (2000). Five days of emotion: An experience sampling study of undergraduate student procrastination. *Journal of Social Behavior & Personality*, 15(5), 239–254.
- Reich, C. M., Howard Sharp, K. M., & Berman, J. S. (2015). A motivational interviewing intervention for the classroom. *Teaching of Psychology*, 42(4), 339-344. <https://doi.org/10.1177/0098628315603250>
- Resnicow, K., & McMaster, F. (2012). Motivational Interviewing: Moving from why to how with autonomy support. *The International Journal of Behavioral Nutrition and Physical Activity*, 9:19. <https://doi.org/10.1186/1479-5868-9-19>

- Rice, K. G., Neimeyer, G. J., & Taylor, J. M. (2011). Efficacy of Coherence Therapy in the treatment of procrastination and perfectionism. *Counseling Outcome Research and Evaluation*, 2(2), 126–136. <https://doi.org/10.1177/2150137811417975>
- Rice, K. G., Richardson, C. M. E., & Clark, D. (2012). Perfectionism, procrastination, and psychological distress. *Journal of Counseling Psychology*, 59(2), 288-302. <https://doi.org/10.1037/a0026643>
- Rollnick, S., Miller, W. R., & Butler, C. C. (2008). *Motivational interviewing in health care: Helping patients change behavior*. Guilford Press.
- Rozental, A., Bennett, S., Forsström, D., Ebert, D. D., Shafran, R., Andersson, G., & Carlbring, P. (2018). Targeting procrastination using psychological treatments: A systematic review and meta-analysis. *Frontiers in Psychology*, 9(1588). <https://doi.org/10.3389/fpsyg.2018.01588>
- Ryan, R. M., & Moller, A. C. (2017). *Competence as central, but not sufficient, for high-quality motivation: A self-determination theory perspective*. In A. J. Elliot, C. S. Dweck, & D. S. Yeager (Eds.), *Handbook of competence and motivation: Theory and application* (pp. 214–231). The Guilford Press.
- Scent, C. L., & Boes, S. R. (2014). Acceptance and commitment training: A brief intervention to reduce procrastination among college students. *Journal of College Student Psychotherapy*, 28(2), 144–156. <https://doi.org/10.1080/87568225.2014.883887>
- Schouwenburg, H. C. (1992). Procrastinators and fear of failure: An exploration of reasons for procrastination. *European Journal of Personality*, 6(3), 225-236. <https://doi.org/10.1002/per.2410060305>

- Schouwenburg, H. C., Lay, C. H., Pychyl, T. A., & Ferrari, J. R. (Eds.). (2004). *Counseling the procrastinator in academic settings*. American Psychological Association. <https://doi.org/10.1037/10808-000>
- Schraw, G., Wadkins, T., & Olafson, L. (2007). Doing the things we do: A grounded theory of academic procrastination. *Journal of Educational Psychology*, 99(1), 12-25. <https://doi.org/10.1037/0022-0663.99.1.12>
- Schultz, P. P., Ryan, R. M., Niemiec, C. P., Legate, N., & Williams, G. C. (2015). Mindfulness, work climate, and psychological need satisfaction in employee well-being. *Mindfulness*, 6(5), 971–985. <https://doi.org/10.1007/s12671-014-0338-7>
- Senecal, C., Koestner, R., & Vallerand, R. J. (1995). Self-regulation and academic procrastination. *The Journal of Social Psychology*, 135(5), 607-619. <https://doi.org/10.1080/00224545.1995.9712234>
- Seo, E. H. (2011). The relationships among procrastination, flow, and academic achievement. *Social Behavior and Personality: An international journal*, 39(2), 209-218. <https://doi.org/10.2224/sbp.2011.39.2.209>
- Solomon, L. J., & Rothblum, E. D. (1984). Academic procrastination: Frequency and cognitive-behavioral correlates. *Journal of Counseling Psychology*, 31(4), 503–509. <https://doi.org/10.1037/0022-0167.31.4.503>
- Steel, P. (2007). The nature of procrastination: A meta-analytic and theoretical review of quintessential self-regulatory failure. *Psychological Bulletin*, 133(1), 65–94. <https://doi.org/10.1037/0033-2909.133.1.65>

- Steel, P., & Ferrari, J. (2013). Sex, Education and procrastination: An epidemiological study of procrastinators' characteristics from a global sample. *European Journal of Personality*, 27(1), 51–58. <https://doi.org/10.1002/per.1851>
- Steel, P., & Klingsieck, K. B. (2016). Academic procrastination: Psychological antecedents revisited. *Australian Psychologist*, 51(1), 36-46. <https://doi.org/10.1111/ap.12173>
- Strait, G. G., Williams, C., & Peters, C. (2019). Classroom-based motivational interviewing for improving college students' academic performance: A randomized trial. *Teaching of Psychology*, 46(2), 164-167. <https://doi.org/10.1177/0098628319834216>
- Suldo, S., Thalji, A., & Ferron, J. (2011). Longitudinal academic outcomes predicted by early adolescents' subjective well-being, psychopathology, and mental health status yielded from a dual factor model. *The Journal of Positive Psychology*, 6(1), 17-30. <https://doi.org/10.1080/17439760.2010.536774>
- Teixeira, P. J., Marques, M. M., Silva, M. N., Brunet, J., Duda, J. L., Haerens, L., La Guardia, J., Lindwall, M., Lonsdale, C., Markland, D., Michie, S., Molle, A., Ntoumanis, N., Patrick, H., Reeve, J., Richard, R., Sebire, S.J., Standage, M., Vansteenkiste, M., ... & Hagger, M. (2020). A classification of motivation and behavior change techniques used in self-determination theory-based interventions in health contexts. *Motivation Science*. <https://doi.org/10.1037/mot0000172>
- Tice, D. M., & Baumeister, R. F. (1997). Longitudinal study of procrastination, performance, stress, and health: The costs and benefits of dawdling. *Psychological Science*, 8(6), 454–458. <https://doi.org/10.1111/j.1467-9280.1997.tb00460.x>

- Toker, B., & Avci, R. (2015). Effect of cognitive-behavioral-theory-based skill training on academic procrastination behaviors of university students. *Educational Sciences: Theory and Practice*, 15(5), 1157-1168. <https://doi.org/10.12738/estp.2015.5.0077>
- Uzun, A. M., Unal, E., & Tokel, S. T. (2014). Exploring Internet addiction, academic procrastination and general procrastination among pre-service ICT teachers. *Mevlana International Journal of Education*, 4(1), 189-201.
- Vallerand, R. J., Pelletier, L. G., Blais, M. R., Brière, N. M., Senecal, C., & Vallieres, E. F. (1992). The Academic Motivation Scale: A measure of intrinsic, extrinsic, and amotivation in education. *Educational and Psychological Measurement*, 52(4), 1003-1017. <https://doi.org/10.1177/0013164492052004025>
- Vallerand, R. J., Pelletier, L. G., Blais, M. R., Brière, N. M., Senecal, C., & Vallieres, E. F. (1993). On the assessment of intrinsic, extrinsic, and amotivation in education: Evidence on the concurrent and construct validity of the Academic Motivation Scale. *Educational and Psychological Measurement*, 53(1), 159-172. <https://doi.org/10.1177/0013164493053001018>
- Van Eerde, W. (2003). A meta-analytically derived nomological network of procrastination. *Personality and Individual Differences*, 35(6), 1401-1418. [https://doi.org/10.1016/S0191-8869\(02\)00358-6](https://doi.org/10.1016/S0191-8869(02)00358-6)
- Van Eerde, W., & Klingsieck, K. B. (2018). Overcoming procrastination? A meta-analysis of intervention studies. *Educational Research Review*, 25, 73-85. <https://doi.org/10.1016/j.edurev.2018.09.002>
- Van Hoecke, A. S., Delecluse, C., Opdenacker, J., Lipkens, L., Martien, S., & Boen, F. (2013). Long-term effectiveness and mediators of a need-supportive physical activity coaching

- among Flemish sedentary employees. *Health Promotion International*, 28(3), 407-417.
<https://doi.org/10.1093/heapro/das025>
- Vansteenkiste, M., Lens, W., De Witte, S., De Witte, H., & Deci, E. L. (2004). The ‘why’ and ‘why not’ of job search behaviour: Their relation to searching, unemployment experience, and well-being. *European Journal of Social Psychology*, 34(3), 345-363.
<https://doi.org/10.1002/ejsp.202>
- Vansteenkiste, M., Sheldon, K. M. (2006). There’s nothing more practical than a good theory: Integrating motivational interviewing and self-determination theory. *British Journal of Clinical Psychology*, 45(1), 63-82. <https://doi.org/10.1348/014466505X34192>
- Vansteenkiste, M., Sierens, E., Soenens, B., Luyckx, K., & Lens, W. (2009). Motivational profiles from a self-determination perspective: The quality of motivation matters. *Journal of Educational Psychology*, 101(3), 671–688. <https://doi.org/10.1037/a0015083>
- Vij, J., & Lomash, H. (2014). Role of motivation in academic procrastination. *International Journal of Scientific & Engineering Research*, 5(8), 1065-1070.
- Visser, L., Schoonenboom, J., & Korthagen, F. A. J. (2017). A field experimental design of a strengths-based training to overcome academic procrastination: Short- and long-term effect. *Frontiers in Psychology*, 8:1949. <https://doi.org/10.3389/fpsyg.2017.01949>
- Wagner, C. C., & Ingersoll, K. S. (2013). *Motivational Interviewing in Groups*. Guilford Press.
<https://doi.org/10.1111/add.12290>
- Walton, G. M., & Wilson, T. D. (2018). Wise interventions: Psychological remedies for social and personal problems. *Psychological Review*, 125(5), 617
655. <https://doi.org/10.1037/rev0000115>

- Walton, G. M., & Yeager, D. S. (2020). Seed and soil: Psychological affordances in contexts help to explain where wise interventions succeed or fail. *Current Directions in Psychological Science*, 29(3), 219–226. <https://doi.org/10.1177/0963721420904453>
- Wang, S., Zhou, Y., Yu, S., Ran, L., Liu, X., & Chen, Y. (2017). Acceptance and commitment therapy and cognitive-behavioral therapy as treatments for academic procrastination: A randomized controlled group session. *Research on Social Work Practice*, 27(1), 48-58. <https://doi.org/10.1177/1049731515577890>
- Williams, G. C., & Deci, E. L. (1996). Internalization of biopsychosocial values by medical students: A test of self-determination theory. *Journal of Personality and Social Psychology*, 70(4), 767–779. <https://doi.org/10.1037/0022-3514.70.4.767>
- Xiao, H., Carney, D. M., Youn, S. J., Janis, R. A., Castonguay, L. G., Hayes, J. A., & Locke, B. D. (2017). Are we in crisis? National mental health and treatment trends in college counseling centers. *Psychological Services*, 14(4), 407-415. <https://doi.org/10.1037/ser0000130>
- Yeager, D. S., Hanselman, P., Walton, G. M., Murray, J. S., Crosnoe, R., Muller, C., Tipton, E., Schneider, B., Hulleman, C.S., Hinojosa, C.P., Paunesku, D., Romero, C., Flint, K., Roberts, A., Trott, J., Iachan, R., Buontemp, J., Man Yang, S., Carvalho, C.M., Hahn, R., ... Dweck, C.S., (2019). A national experiment reveals where a growth mindset improves achievement. *Nature*, 573(7774), 364-369. <https://doi.org/10.1038/s41586-019-1466-y>
- Zacks, S. & Hen, M. (2018). Academic interventions for academic procrastination: A review of the literature. *Journal of Prevention & Intervention in the Community*, 46(2), 117-130. <https://doi.org/10.1080/10852352.2016.1198154>

- Zhang, Y., Dong, S., Fang, W., Chai, X., Mei, J., & Fan, X. (2018). Self-efficacy for self-regulation and fear of failure as mediators between self-esteem and academic procrastination among undergraduates in health professions. *Advances in Health Sciences Education, 23*, 817-830. <https://doi.org/10.1007/s10459-018-9832-3>
- Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. *Theory Into Practice, 41*(2), 64-70. https://doi.org/10.1207/s15430421tip4102_2

General Discussion

Research on academic procrastination has been at the forefront of academic research for decades, being examined through the lens of many different theories and perspectives (Steel, 2007). Given SDT's focus on motivation and human growth, research began to emerge nearly

two decades ago that focused on the relationship between individuals' level of self-determination or motivational regulation styles and academic procrastination (Garn et al., 2010; Lee, 2005; Senécal et al., 1995; Senécal et al., 2003). However, these studies did not examine the antecedents to self-determination or motivational regulation and their relationship with academic procrastination. SDT posits that BPN satisfaction results in more self-determination and autonomous motivation styles (Deci & Ryan, 1985) and, thus, may play a direct and significant role in academic procrastination. A small body of SDT literature has supported this hypothesis. Their results suggest that BPN satisfaction plays a significant role in academic motivation and academic procrastination (Cavusoglu & Karatas, 2015; Codina et al., 2018). Our studies' overarching goal was to extend previous research by examining the relationships between BPN satisfaction and frustration, academic motivation, and procrastination, both theoretically and practically. In this general discussion, I briefly summarize the focus of the two studies and their respective findings. Concerning SDT, academic motivation, and the procrastination literature, I will discuss the theoretical, research, and practical implications of these studies. Limitations and future discussions are also discussed to situate the findings.

Summary of Key Findings

Study 1. The first study aimed to examine whether academic motivation mediated the relationship between BPN satisfaction and frustration and procrastination. This study laid the theoretical groundwork for the second study, as it aimed to demonstrate the potential usefulness of targeting BPN satisfaction for producing changes in academic motivation and procrastination. Broadly, the first study results suggested that BPN satisfaction is directly and negatively related to procrastination and indirectly related to procrastination through autonomous academic motivation and amotivation. In contrast, BPN frustration was directly and positively associated

with procrastination and indirectly associated with procrastination through autonomous academic motivation. BPN satisfaction significantly predicated all three types of academic motivation, with the relationship between BPN satisfaction and autonomous motivation being the most significant. Moreover, our findings suggested that BPN frustration was a stronger predictor of negative outcomes, such as amotivation, than positive outcomes, such as autonomous motivation. Autonomous motivation was negatively associated with procrastination, whereas amotivation was positively associated with procrastination. Controlled motivation was not significantly associated with procrastination.

Study 2. The second study aimed to use SDT as a theoretical framework to develop an intervention that would target the BPN. By targeting the BPN, we hoped to increase academic motivation and decrease procrastination. MI techniques were used to target BPN in a consistent, evidence-based manner. The use of MI techniques in the context of SDT has been recommended by both SDT and MI researchers in recent years (Deci & Ryan, 2012; Miller & Rollnick, 2013; Patrick & Williams, 2012; Teixeira et al., 2012; Vansteenkiste & Sheldon, 2006; Vansteenkiste & Ryan, 2013); however, there have not been any studies in the academic context that have married these two approaches. For this reason, the second study not only sought to examine the effects of the intervention on academic motivation and procrastination but also sought to determine whether MI techniques were effective in targeting SDT variables such as BPN satisfaction and frustration. We also aimed to replicate the findings from Study 1. Our intervention results suggested that MI strategies successfully increased BPN satisfaction, as the INT group experienced significant increases in BPN satisfaction compared to the CON group. The intervention results did not suggest that targeting BPN satisfaction and frustration, and academic motivation, produced significant changes in procrastination in an intervention context, as we did

not see significant differences pre- and post-intervention. However, we do not believe the results of this study suggest our approach's ineffectiveness; instead, they suggest that improvements could be made to future interventions of this nature to produce and measure significant changes in procrastination. The theoretical models' results replicated most of the findings from the previous study (Study 1); however, there were inconsistencies regarding the relationships between autonomous motivation, amotivation, and procrastination in the context of BPN satisfaction.

Integrating the findings

Overall, these studies' findings contribute to a more nuanced understanding of how BPN satisfaction and frustration, academic motivation, and procrastination are related to one another in theoretical and practical contexts. Understanding the complex relationships between these variables has several important theoretical, research, and practical implications.

Theoretical Implications

SDT and Academic Motivation. The results of these two studies support and extend previous research regarding the relationship between BPN and academic motivation. According to SDT, BPN satisfaction is the most important antecedent to more autonomous or self-determined motivations (Deci & Ryan, 1985). In addition, more autonomous or self-determined motivation has been shown to result in decreased academic procrastination (Burnam et al., 2014; Garn et al., 2010; Lee, 2005; Senécal et al., 1995; Senécal et al., 2003; Vansteenkiste et al., 2009). Overall, the modelling results of these studies align with these previous findings. For example, BPN satisfaction was significantly and positively associated with autonomous motivation and negatively associated with amotivation in both studies. The positive relationship

between BPN satisfaction and autonomous motivation is one of the most well-established and consistent relationships within SDT literature and across different domains (Deci & Ryan, 2008; Milyavskaya & Koestner, 2011; Olafesen et al., 2018; Ryan & Deci, 2000; Vansteenkiste et al., 2006). The negative relationship between BPN satisfaction and amotivation is also well-situated within the literature (Codina et al., 2018; Haerens et al., 2015).

Interestingly, BPN satisfaction positively predicted controlled motivation in Study 1; however, it was not significantly associated with controlled motivation in Study 2. Some studies have shown that students can endorse autonomous and controlled academic motivations (Vansteenkiste et al., 2009). For example, Vansteenkiste et al. (2009) found that a “high quantity motivation” group exists among students. These students have a higher amount of motivation but endorse both autonomous and controlled motivations. On the other hand, “good quality motivation” reflects students with high autonomous and low controlled motivation. Based on SDT assumptions, the “high quantity motivation” group may represent students that perceive their needs as somewhat satisfied, resulting in a combination of both autonomous and controlled academic motives. The “high quality motivation” group may represent students that perceive their needs as holistically satisfied.

In addition, previous studies have found that when not all needs are satisfied, it may result in more controlled motivations. For example, competence satisfaction has been uniquely associated with introjected regulation, whereas identified regulation and intrinsic motivation are associated with a combination of autonomy and competence satisfaction (Haerens et al., 2015; Silva et al., 2010). Our sample of students may have perceived greater competence satisfaction than autonomy satisfaction, which would result in partial internalization. Students are more likely to endorse autonomous and controlled motivations without a balance of autonomy and

competence satisfaction, resulting in more “high quantity motivation” students than “good quality motivation” students. This may explain the positive relationship between BPN satisfaction and controlled motivation in the first study. Given the inconsistencies between the two studies, however, future research should aim to unpack further the differential impacts of the satisfaction of each BPN and their relationship with more controlled motivations.

The inclusion of BPN frustration in these studies contributes to SDT research as a whole and SDT-related procrastination research. Previous studies have found that BPN frustration is more likely to result in less optimal motivational outcomes such as controlled motivation and amotivation, and negative outcomes, generally (Haerens et al., 2015; Vansteenkiste & Ryan, 2013). In line with other studies, our results suggested that BPN frustration is associated with amotivation or the lack of intentionality to engage in a specific learning activity (Codina et al., 2018). Because BPN frustration is the active blocking of the BPN—and results in feelings of pressure, failure and loneliness—it is not surprising that it would negatively impact a students’ ability to engage in school-related tasks.

Other studies have found that BPN frustration significantly predicted controlled motivation but not autonomous motivation when students perceived controlling teaching (Haerens et al., 2015). Our results found the opposite, as BPN frustration did not significantly predict controlled motivation but significantly predicted autonomous motivation. Moreover, the results suggested that autonomous motivation played a mediating role in the relationship between BPN frustration and academic procrastination in both studies. This may suggest that autonomous motivation plays a larger role in facilitating procrastination behaviours than amotivation when needs are frustrated, as amotivation was only a significant mediator in Study 2. Findings by Vansteenkiste et al. (2009) support this, as they found that adding autonomous motivation to no

motivation at all may play a significant role in learning. Although interesting, these results must be interpreted as preliminary and warrant further investigation as our model did not have adequate fit.

SDT and Academic Procrastination. The results of these studies serve to broaden the explanatory power of SDT to academic procrastination behaviours. In both studies, BPN satisfaction was significantly and negatively associated with procrastination. This supports the results of a small body of work that has examined these relationships thus far and suggests that as BPN satisfaction increases, academic procrastination decreases (Cavusoglu & Karatas, 2015; Codina et al., 2018). When students have their BPN satisfied within their academic environment, this creates optimal conditions for fostering and developing engagement, self-regulation, and autonomous motivation, all of which are negatively associated with procrastination (Codina et al., 2018; Vansteenkiste et al., 2009).

Extending previous research, our research suggested that BPN frustration significantly predicted academic procrastination. Our modelling in Study 1 suggested that the direct relationship between BPN frustration and procrastination was greater than that of BPN satisfaction. As previously mentioned, BPN frustration is more strongly associated with negative outcomes than lower BPN satisfaction (Vansteenkiste & Ryan, 2013). Qualitative studies have reported that students often experience feelings of pressure and perceived lack of competence, which significantly contributed to their procrastination (Grunschel et al., 2013). In combination with qualitative research, our findings demonstrate the impact and presence of need frustration in post-secondary institutions and its contribution to academic procrastination.

It must be noted that BPN was primarily examined as a composite score due to SDT's assumption that the satisfaction of one need is associated with the satisfaction of the other two

needs, and several studies have taken this approach (Deci et al., 2001; Milyavaskaya & Koestner, 2011; Van den Broeck et al., 2008). However, we found evidence that separately examining each need may provide further insights into these relationships. In Study 2, for example, separately examining the BPN allowed for potential explanations as to why there were no increases in autonomous motivation. Moreover, the results suggested that competence satisfaction may have a more proximal relationship with procrastination, as it had the strongest negative association with procrastination. There have been previous studies in other contexts that have found differential relationships amongst the needs. For example, in the context of well-being in structured exercise, autonomy satisfaction did not emerge as a significant predictor, whereas relatedness satisfaction was highly significant, contrasting our results (Gunnell et al., 2014). Our findings, therefore, suggest potential advantages for the disaggregated examination of these relationships across different contexts as composite scores may not capture the role of each BPN.

Research Implications

Motivation. When examining the relationships between academic motivation and academic procrastination, our Study 1 results agreed with previous research. For example, autonomous motivation was negatively and significantly associated with procrastination, whereas amotivation was significantly and positively associated with procrastination. The negative relationship between autonomous motivation and procrastination was found in initial examinations of these relationships (Senécal et al., 1995) and more recent literature (Burnam et al., 2014; Cerino, 2004; Kok, 2016; Vij & Lomash, 2014). Despite similar coefficients in Study 2, we did not find significant associations between autonomous motivation, amotivation, and academic procrastination. Study 2 results suggested a significant relationship between controlled motivation and academic procrastination, which contrasts the insignificant relationship between

these variables in Study 1. Lee (2005) found that non-self-determined extrinsic motivation (i.e., controlled motivations) was not a significant predictor of academic procrastination; however, Vansteenkiste et al. (2009) found that students who had low autonomous and low controlled motivation (i.e., low quantity motivation) had less test anxiety, were less likely to procrastinate, and put more effort into their studies than those who had low autonomous and high controlled motivation (i.e., poor quality motivation). This suggests that having more controlled motivations can result in more procrastination than those who are less motivated in general.

The inconsistent findings in both studies may also be related to the use of the AMS. Despite being one of the most frequently used scales to measure academic motivation, the AMS's psychometric adequacy has been questioned in several studies. Concerning correlations have been identified among the subscales, such as the high correlation between the intrinsic motivation subscale and the introjected subscale (Barkoukis et al., 2008; Fairchild et al., 2005; Vallerand et al., 1993). Moreover, the correlations between the different types of intrinsic motivations were high. Future research should aim to measure motivation using an additional scale to compare with the AMS or an entirely different scale to ensure the findings' accuracy.

Procrastination. Academic procrastination is one of the most prevalent and poorly understood behaviours in academic research. Although there are still many procrastination aspects that need further exploration, the current research enriches the existing procrastination antecedent literature. For example, our research suggests that BPN satisfaction is negatively associated with procrastination, whereas BPN frustration is positively associated with procrastination. Our research also suggests that BPN satisfaction and frustration are directly associated with procrastination and indirectly associated with procrastination through different academic motivation types (Study 1). The current research also provides further evidence of

relationships between motivation and academic procrastination. Other studies have indeed called attention to academic procrastination's motivational basis; however, there is still limited research that examines academic procrastination in the context of SDT. Because our two studies' results differed, there is a need to continue examining these relationships to expand our knowledge of how the different types of motivation are associated with academic procrastination.

Interestingly, BPN satisfaction and frustration were more significantly associated with procrastination than the three types of academic motivation. This suggests the importance of the social context of procrastination. A significant amount of procrastination research has focused on the procrastinator's personal antecedents (e.g., personality traits) or situational antecedents (e.g., task characteristics; Klingiseck et al., 2013). When procrastination is examined individualistically through personal antecedents (e.g., self-regulation), the responsibility rests on the individual to make changes rather than the institution. Given that procrastination is much higher in the student population than in the general population, it suggests that system-level changes are needed.

A limited body of literature has focused on how post-secondary institutions contribute to academic procrastination (Codina et al., 2018; Corkin et al., 2014; Patrzek et al., 2012; Schraw et al., 2007). Schraw et al. (2007) found that instructors who were perceived as having unclear directions or low expectations for coursework fostered procrastination. Codina et al. (2018) found that controlling teaching behaviours were associated with procrastination, whereas autonomy-supportive teaching behaviours were associated with need satisfaction and reduced procrastination. In our studies, participants were asked about their perception of their BPN satisfaction and frustration at their current university. Results suggested that those with a lower perception of their needs being met were more likely to engage in procrastination. Although

peers are involved in supporting one another's needs, the university's climate plays a significant role in BPN satisfaction. For example, having professors who engage with students in a need supportive manner can influence the students' perceptions of their need satisfaction. Therefore, our results provide evidence of the importance of providing a learning climate that satisfies students' BPN. If a student perceives their learning climate as unsupportive or controlling, it will likely lead to procrastination. This knowledge can be used to inform primary strategies for reducing procrastination, such as appropriate training of instructors to provide autonomy support, and secondary and tertiary intervention strategies, such as workshops or peer support groups.

Practical Implications

One of this study's main goals was to apply our findings to a practical context and highlight alternative ways post-secondary institutions can target academic procrastination. Although there have been many procrastination interventions, this is the first intervention to use SDT as a theoretical framework and utilize MI to target SDT variables. Moreover, this is one of the few studies that examined MI in an academic and group setting. Although we did not obtain all of our desired results, the intervention provided insights for future intervention approaches and techniques applied on a grander scale.

Our results suggested that our intervention—and MI techniques—were successful in increasing students' perceptions of their BPN satisfaction in their current academic context. The use of MI techniques in the context of SDT variables have been used in other contexts, such as physical health (Duda et al., 2014; Fortier et al., 2007; McFadden et al., 2017); however, these two approaches have not been used in an academic context. The effectiveness of this approach has several implications. First, it demonstrated the compatibility of SDT and MI. As previously mentioned, the comparison between this theory and approach has been discussed by SDT and MI

researchers alike (Miller & Rollnick, 2012; Patrick & Williams, 2012; Vansteenkiste & Sheldon, 2006). The discussion has predominantly centred on whether there is merit to this comparison and whether this theory and approach can address limitations in each. Our results support the suggestion that SDT can explain the effectiveness of MI techniques, and MI techniques can be used as a practical approach to target SDT variables. A particular strength of this study was the strict use of MI techniques to reliably conclude that the intervention's effects were solely the result of MI techniques.

This study also suggested MI's effectiveness in providing an autonomy-supportive environment, explaining its effectiveness in targeting the BPN. Autonomy support is central to both SDT and MI. In MI, autonomy support is promoted through various MI techniques such as acknowledging client perspectives and values, encouraging client decision-making, and limiting coercion and persuasion (Resnicow & McMaster, 2012). Similarly, SDT posits that autonomy support is facilitated by supporting individuals' goal pursuits, providing choice whenever possible, and perspective-taking (Deci & Ryan, 1985). Providing an autonomy-supportive environment has been linked to BPN satisfaction and autonomous motivational states across SDT literature (Adie et al., 2008; McLachlan & Hagger, 2010; Ratelle et al., 2005; Ryan & Deci, 2000). All of the participants in the INT group reported feeling supported in the workshop (84%), more in control of their procrastination after the workshop (82%) and motivated to change their behaviour (98%). Furthermore, MI fidelity ratings suggested that the facilitator sought collaboration and emphasized autonomy. For this reason, one might conclude that the use of MI techniques in our intervention fostered an autonomy-supportive environment, which led to increases in BPN satisfaction. Given that BPN satisfaction has positive impacts on academic outcomes and well-being (Reeve et al., 2008; Sheldon & Filak, 2008), MI techniques could be

used to provide a more autonomy-supportive environment for students, leading to BPN satisfaction and a variety of positive academic and non-academic outcomes.

Although a recent study (Teixeira et al., 2020) classified the motivation and behaviour change techniques (MBCTs) used in past SDT-based interventions within the health context, empirical testing is needed to determine the efficacy of these techniques across contexts. Moreover, the techniques will have to be tested in various conditions to determine the moderators of efficacy in the change and maintenance of behaviours (Teixeira et al., 2020). Nonetheless, the classification of these techniques has contributed significantly to SDT literature and will help inform future SDT-based interventions.

Some universities have already begun to adapt their classrooms to be more autonomy supportive using an SDT-based approach (e.g., Purdue University; Levesque-Bristol et al., 2019); however, the need for further research examining SDT MBCTs remains. MI could be an alternative strategy due to its similarities to SDT, the well-established efficacy of its techniques, and its easy dissemination through developed training programs. For example, post-secondary institutions could provide MI training to professors, academic advisors, and administrative staff to ensure that students' interactions are more autonomy supportive. When engaging with students, academic advisors could be trained to utilize the MI strategy of reflections to encourage personal exploration of students' academic goals (Hardcastle et al., 2016). Moreover, instructors could be trained to use affirmations during class discussions (e.g., "You all demonstrated critical thinking skills during this discussion"). With staff utilizing MI techniques, students should perceive post-secondary institutions as more autonomy supportive, which would significantly impact BPN satisfaction and potential impacts on autonomous motivation, academic procrastination, or other positive academic and non-academic outcomes. Although we piloted

this intervention with a specific theory, approach, and outcome in mind, we hope this study's findings can be used to inform interventions with differing outcomes or in different domains. For example, our approach could be adapted to target the facilitation of more useful academic behaviours. Furthermore, this approach could be used with different academic populations, such as high school students.

Post-secondary institutions are consistently looking for cost-effective ways to foster positive environments and outcomes for their students. This intervention provided a cost-effective approach to a prevalent issue plaguing the student population, as the workshop itself required minimal training, resources, and time. Although MI requires practice and supervised experience, paraprofessionals such as psychology graduate students can be trained and encouraged to develop their skills as they work with students. Moreover, the intervention consisted of two one-hour workshops conducted with few resources due to the group format. Suppose a university could train several graduate students. In that case, this intervention could be disseminated to a large portion of the student population using limited resources through a student mentoring centre. Given our approach's effectiveness in fostering BPN satisfaction, there could be significant benefits to implementing this workshop on a larger scale.

Limitations and Future Directions

The findings and contributions of these studies should be considered in the context of their limitations. The most significant limitation of this research was the lack of longitudinal measurement of the variables. In Study 1, all variables were measured cross-sectionally to expedite the completion of this study. In Study 2, we aimed to collect follow-up measures of the variables; however, we could not obtain a large enough response rate on the follow-up questionnaire to conduct statistical analysis. Although we offered a \$20 gift-card as

compensation for completing the follow-up measures, this did not attract many participants. Also, we may not have advertised the opportunity sufficiently, as we only sent an initial email to participants to participate in the follow-up, as well as a follow-up email. A follow-up was crucial for this study, as it may have captured any lagged effects of the intervention. For example, our results suggested potential positive trends related to autonomy satisfaction, which, in combination with competence satisfaction, would have the potential to increase autonomous motivation (Deci & Ryan, 2000). Theoretically, increased autonomous motivation should have resulted in decreased procrastination. Unfortunately, we can only speculate on these effects. Therefore, future studies should aim to collect longitudinal measurements of all variables and determine feasible methods of collecting follow-up data, include more substantial incentives for participants and a reasonable protocol for reminding participants of the opportunity to complete the follow-up measures.

Another limitation of the current studies was testing basic psychological need satisfaction and frustration in separate models. Although there have been a significant number of studies that have only tested need satisfaction (Adie et al., 2008; Cavusoglu & Karatas, 2015; Deci et al., 2001; Faye & Sharp, 2008) or used separate models to examine both of these concepts (Krijgsman et al., 2017), the dual-process framework proposed by SDT researchers recommends testing both concepts together. Essentially, this framework posits that need satisfaction and need frustration are two processes that act in tandem (Teixeira et al., 2020). Because of this, testing only one of the concepts when examining motivation does not provide a holistic picture of the outcomes or testing of the theory. Moreover, it increases the likelihood of reporting significant false results. Future research should ensure both concepts are included in the models to make more significant contributions to the current motivation literature.

In addition to the comparisons above, neither of the studies considered other participant characteristics in their analyses. Future research should aim to analyze the results between sex, gender, previous experience with academic services, and year of study. Much of these analyses were omitted due to a lack of differences in preliminary analyses and the inability to conduct analyses due to sample size. In Study 1, we found significant differences in gender on some variables; however, the inclusion of gender in the model did not affect the results. In Study 2, we only found one significant gender difference across both groups, time points, and variables. Furthermore, examining intervention effects by sex—or any other participants characteristic that would further split the groups—would have significantly reduced the ability to detect significant intervention effects.

Despite the limitations of the studies, several strengths should be noted. First, this research included an approach that was both theoretical and practical. Our first study tested the relationships between SDT variables and procrastination as a theoretical framework for our second study. Our second study was designed to reflect this theoretical framework by utilizing evidence-based techniques to target these variables. Our second used a randomized control trial (RCT) design, improving upon previous interventions that did not use this scientific design. Using an RCT design increases the results' ability or effects to be attributed to the intervention itself instead of a naturally occurring phenomenon. Furthermore, previous studies had small sample sizes and low power. On the other hand, our study was powered by a large sample size, with nearly one-hundred participants per group. Finally, our intervention utilized one specific set of techniques and one theoretical perspective as a means of distilling the value of these techniques. Other procrastination interventions have taken techniques from various approaches and theories, making it more challenging to discern effective techniques. Although our

intervention did not produce changes in procrastination behaviours, we gained a greater understanding of how MI can be applied to increase BPN satisfaction, leading to increases in other well-being measures. Moreover, our intervention provided fundamental knowledge of improving future interventions utilizing this approach to affect different academic and non-academic outcomes.

Conclusion

The present research results contributed to a more nuanced understanding of the relationship between BPN satisfaction and frustration, the different types of academic motivation, and academic procrastination. Our academic procrastination intervention provided essential insights related to the effectiveness of MI strategies in targeting BPN variables and future theoretical and methodological considerations when designing future procrastination interventions. We hope this research provides post-secondary institutions with the knowledge that will enable them to meet their students' needs better and reduce the prevalence of negative academic behaviours and academic outcomes.

References (General Introduction and Discussion)

- Adie, J. W., Duda, J. L., & Ntoumanis, N. (2008). Autonomy support, basic need satisfaction and the optimal functioning of adult male and female sport participants: A test of basic needs theory. *Motivation and Emotion*, 32(3), 189-199. <https://doi.org/10.1007/s11031-008-9095-z>
- Aremu, A. O., Williams, T. M., & Adesina, F. (2011). Influence of academic procrastination and personality types on academic achievement and efficacy of in-school adolescents in Ibadan. *IFE Psychologia: An International Journal*, 19(1), 93-113. <https://doi.org/10.4314/ife.v19i1.64591>
- Atkinson, C., & Woods, K. (2003). Motivational interviewing strategies for disaffected secondary school students: A case example. *Educational Psychology in Practice*, 19(1), 49-64. <https://doi.org/10.1080/0266736032000061206>
- Baker, J. P., & Goodboy, A. K. (2018). Students' self-determination as a consequence of instructor misbehaviors. *Communication Research Reports*, 35(1), 68-73. <https://doi.org/10.1080/08824096.2017.1366305>
- Barkoukis, V., Tsorbatzoudis, H., Grouios, G., & Sideridis, G. (2008). The assessment of intrinsic and extrinsic motivation and amotivation: Validity and reliability of the Greek version of the Academic Motivation Scale. *Assessment in Education: Principles, Policy & Practice*, 15(1), 39-55. <https://doi.org/10.1080/09695940701876128>
- Bartholomew, K. J., Ntoumanis, N., Ryan, R. M., Bosch, J. A., & Thøgersen-Ntoumani, C. (2011). Self-determination theory and diminished functioning: The role of interpersonal

- control and psychological need thwarting. *Personality and Social Psychology Bulletin*, 37(11), 1459-1473. <https://doi.org/10.1177/0146167211413125>
- Beswick, G., Rothblum, E. D., & Mann, L. (1988). Psychological antecedents of student procrastination. *Australian psychologist*, 23(2), 207-217.
<https://doi.org/10.1080/00050068808255605>
- Boggiano, A. K., & Ruble, D. N. (1979). Competence and the overjustification effect: A developmental study. *Journal of Personality and Social Psychology*, 37(9), 1462.
<https://doi.org/10.1037/0022-3514.37.9.1462>
- Borrelli, B., McQuaid, E. L., Novak, S. P., Hammond, S. K., & Becker, B. (2010). Motivating Latino caregivers of children with asthma to quit smoking: a randomized trial. *Journal of consulting and clinical psychology*, 78(1), 34. <https://doi.org/10.1037/a0016932>
- Black, A. E., & Deci, E. L. (2000). The effects of student self-regulation and instructor autonomy support on learning in a college-level natural science course: A self-determination theory perspective. *Science Education*, 84, 740–756.
[https://doi.org/10.1002/1098-237X\(200011\)84:6<740::AID-SCE4>3.0.CO;2-3](https://doi.org/10.1002/1098-237X(200011)84:6<740::AID-SCE4>3.0.CO;2-3)
- Burka, J. B., & Yuen, L. M. (2008). *Procrastination: Why You Do It, What to Do about It Now*. Da Capo Press.
- Burnam, A., Komarraju, M., Hamel, R., & Nadler, D. R. (2014). Do adaptive perfectionism and self-determined motivation reduce procrastination? *Learning and Individual Differences*, 36, 165–172. <https://doi.org/10.1016/j.lindif.2014.10.009>

- Byiers, B. J., Reichle, J., & Symons, F. J. (2012). Single-subject experimental design for evidence-based practice. *American Journal of Speech-Language Pathology*, 21(4), 397-414. [http://doi.org/10.1044/1058-0360\(2012/11-0036\)](http://doi.org/10.1044/1058-0360(2012/11-0036))
- Cavusoglu, C., & Karatas, H. (2015). Procrastination of undergraduates: Self-determination theory and academic motivation. *The Anthropologist*, 20(3), 735-743. <https://doi.org/10.1080/09720073.2015.11891780>
- Cerino, E. S. (2014). Relationships Between Academic Motivation, Self-Efficacy, and Academic Procrastination. *Psi Chi Journal of Psychological Research*, 19(4). 10.24839/2164-8204.JN19.4.156
- Chan, K. K., Neighbors, C., Gilson, M., Larimer, M. E., & Marlatt, G. A. (2007). Epidemiological trends in drinking by age and gender: Providing normative feedback to adults. *Addictive behaviors*, 32(5), 967-976. <https://doi.org/10.1016/j.addbeh.2006.07.003>
- Chan, D. K. C., Zhang, L., Lee, A. S. Y., & Hagger, M. S. (2020). Reciprocal relations between autonomous motivation from self-determination theory and social cognition constructs from the theory of planned behavior: A cross-lagged panel design in sport injury prevention. *Psychology of Sport and Exercise*, 48, Advanced online publication. doi:10.1016/j.psychsport.2020.101660
- Chang, Y. K., Chen, S., Tu, K. W., & Chi, L. K. (2016). Effect of autonomy support on self-determined motivation in elementary physical education. *Journal of sports science & medicine*, 15(3), 460.
- Chen, B., Vansteenkiste, M., Beyers, W., Boone, L., Deci, E. L., Van der Kaap-Deeder, J., Duriez, B., Lens, W., Matos, L., Mouratidis, A., Ryan, R.M., Sheldo, K.M., Soenens, B.,

- Van Petegem, S., & Verstuf, J. (2015). Basic psychological need satisfaction, need frustration, and need strength across four cultures. *Motivation and Emotion*, 39(2), 216-236. <https://doi.org/10.1007/s11031-014-9450-1>
- Chun Chu, A. H., & Choi, J. N. (2005). Rethinking procrastination: Positive effects of "active" procrastination behavior on attitudes and performance. *The Journal of social psychology*, 145(3), 245-264. <https://doi.org/10.3200/SOCP.145.3.245-264>
- Codina, N., Valenzuela, R., Pestana, J. V., & Gonzalez-Conde, J. (2018). Relations between student procrastination and teaching styles: autonomy-supportive and controlling. *Frontiers in psychology*, 9, 809. <https://doi.org/10.3389/fpsyg.2018.00809>
- Corkin, D. M., Shirley, L. Y., Wolters, C. A., & Wiesner, M. (2014). The role of the college classroom climate on academic procrastination. *Learning and Individual Differences*, 32, 294-303. <https://doi.org/10.1016/j.lindif.2014.04.001>
- Cryer, S., & Atkinson, C. (2015). Exploring the use of motivational interviewing with a disengaged primary-aged child. *Educational psychology in practice*, 31(1), 56-72. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4536940/>
- Deci, E., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. Springer Science & Business Media.
- Deci, E. L., & Ryan, R. M. (2008). Self-determination theory: A macrotheory of human motivation, development, and health. *Canadian psychology/Psychologie canadienne*, 49(3), 182. <https://doi.org/10.1037/a0012801>

- Deci, E. L., & Ryan, R. M. (2012). Self-determination theory in health care and its relations to motivational interviewing: a few comments. *International Journal of Behavioral Nutrition and Physical Activity*, 9(1), 24. <https://doi.org/10.1186/1479-5868-9-24>
- Deci, E. L., Ryan, R. M., Gagné, M., Leone, D. R., Usunov, J., & Kornazheva, B. P. (2001). Need satisfaction, motivation, and well-being in the work organizations of a former eastern bloc country: A cross-cultural study of self-determination. *Personality and social psychology bulletin*, 27(8), 930-942. <https://doi.org/10.1177/0146167201278002>
- Deci, E. L., Schwartz, A. J., Sheinman, L., & Ryan, R. M. (1981). An instrument to assess adults' orientations toward control versus autonomy with children: Reflections on intrinsic motivation and perceived competence. *Journal of educational Psychology*, 73(5), 642. <https://doi.org/10.1037/0022-0663.73.5.642>
- De Meyer, J., Soenens, B., Vansteenkiste, M., Aelterman, N., Van Petegem, S., & Haerens, L. (2016). Do students with different motives for physical education respond differently to autonomy-supportive and controlling teaching?. *Psychology of Sport and Exercise*, 22, 72-82. <https://doi.org/10.1016/j.psychsport.2015.06.001>
- Dewitte, S., & Schouwenburg, H. C. (2002). Procrastination, temptations, and incentives: The struggle between the present and the future in procrastinators and the punctual. *European Journal of Personality*, 16(6), 469-489. <https://doi.org/10.1002/per.461>
- Di Fabio, A. (2006). Decisional procrastination correlates: personality traits, self-esteem or perception of cognitive failure?. *International Journal for Educational and Vocational Guidance*, 6(2), 109-122. <https://doi.org/10.1007/s10775-006-9000-9>

- Duda, J. L., Williams, G. C., Ntoumanis, N., Daley, A., Eves, F. F., Mutrie, N., Rouse, P.C., Lodhia, R., Blamey, R.V., & Jolly, K. (2014). Effects of a standard provision versus an autonomy supportive exercise referral programme on physical activity, quality of life and well-being indicators: a cluster randomised controlled trial. *International Journal of Behavioral Nutrition and Physical Activity*, 11(1), 10. <https://doi.org/10.1186/1479-5868-11-10>
- Edmunds, J., Ntoumanis, N., & Duda, J. L. (2008). Testing a self-determination theory-based teaching style intervention in the exercise domain. *European Journal of Social Psychology*, 38(2), 375-388. https://www.researchgate.net/publication/230702174_Testing_a_self-determination_theory-based_teaching_style_intervention_in_the_exercise_domain
- Fairchild, A. J., Horst, S. J., Finney, S. J., & Barron, K. E. (2005). Evaluating existing and new validity evidence for the Academic Motivation Scale. *Contemporary Educational Psychology*, 30(3), 331-358. doi:10.1016/j.cedpsych.2004.11.001
- Faye, C., & Sharpe, D. (2008). Academic motivation in university: The role of basic psychological needs and identity formation. *Canadian Journal of Behavioural Science/Revue canadienne des sciences du comportement*, 40(4), 189. <https://doi.org/10.1037/a0012858>
- Ferrari, J. R. (2000). Procrastination and attention: Factor analysis of attention deficit, boredomness, intelligence, self-esteem, and task delay frequencies. *Journal of Social Behavior and Personality*, 15(5), 185. https://www.researchgate.net/publication/232555351_Procrastination_and_Attention_Fac

tor Analysis of Attention Deficit Boredomness Intelligence Self-
Esteem and Task Delay Frequencies

- Ferrari, J. R., & Scher, S. J. (2000). Toward an understanding of academic and nonacademic tasks procrastinated by students: The use of daily logs. *Psychology in the Schools*, 37(4), 359-366. https://thekeep.eiu.edu/cgi/viewcontent.cgi?article=1027&context=psych_fac
- Fleming, A. P., & McMahon, R. J. (2012). Developmental context and treatment principles for ADHD among college students. *Clinical child and family psychology review*, 15(4), 303-329. <https://doi.org/10.1007/s10567-012-0121-z>
- Flett, G. L., Schmidt, D. H., Besser, A., & Hewitt, P. (2016). Interpersonal personality vulnerabilities, stress, and depression in adolescents: Interpersonal hassles as a mediator of sociotropy and socially prescribed perfectionism. *International Journal of Child and Adolescent Resilience (IJCAR)*, 4(1), 103-121. <https://ijcar-rirea.ca/index.php/ijcar-rirea/article/view/207>
- Fortier, M. S., Duda, J. L., Guerin, E., & Teixeira, P. J. (2012). Promoting physical activity: development and testing of self-determination theory-based interventions. *The international journal of behavioral nutrition and physical activity*, 9, 20. <https://doi.org/10.1186/1479-5868-9-20>
- Fortier, M. S., Sweet, S. N., O'Sullivan, T. L., & Williams, G. C. (2007). A self-determination process model of physical activity adoption in the context of a randomized controlled trial. *Psychology of Sport and Exercise*, 8(5), 741-757. <https://doi.org/10.1016/j.psychsport.2006.10.006>

- Fortier, M. S., Vallerand, R. J., & Guay, F. (1995). Academic motivation and school performance: Toward a structural model. *Contemporary educational psychology*, 20(3), 257-274. <https://doi.org/10.1006/ceps.1995.1017>
- Garn, A. C., Matthews, M. S., & Jolly, J. L. (2010). Parental influences on the academic motivation of gifted students: A self-determination theory perspective. *Gifted Child Quarterly*, 54(4), 263-272. <https://doi.org/10.1177/0016986210377657>
- Gingerich, K. J., Turnock, P., Litfin, J. K., & Rosén, L. A. (1998). Diversity and attention deficit hyperactivity disorder. *Journal of clinical psychology*, 54(4), 415-426. [https://doi.org/10.1002/\(SICI\)1097-4679\(199806\)54:4<415::AID-JCLP3>3.0.CO;2-M](https://doi.org/10.1002/(SICI)1097-4679(199806)54:4<415::AID-JCLP3>3.0.CO;2-M)
- Gort, C., Marcusson-Clavertz, D., & Kuehner, C. (2020). Procrastination, Affective State, Rumination, and Sleep Quality: Investigating Reciprocal Effects with Ambulatory Assessment. *Journal of Rational-Emotive & Cognitive-Behavior Therapy*, 1-28. <https://doi.org/10.1007/s10942-020-00353-4>
- Glick, D. M., & Orsillo, S. M. (2015). An investigation of the efficacy of acceptance-based behavioral therapy for academic procrastination. *Journal of Experimental Psychology: General*, 144(2), 400. <https://doi.org/10.1037/xge0000050>
- Greaves, C. J., Middlebrooke, A., O'Loughlin, L., Holland, S., Piper, J., Steele, A., ... & Daly, M. (2008). Motivational interviewing for modifying diabetes risk: a randomised controlled trial. *Br J Gen Pract*, 58(553), 535-540. <https://doi.org/10.3399/bjgp08X319648>
- Grunschel, C., Patrzek, J., & Fries, S. (2013). Exploring reasons and consequences of academic procrastination: An interview study. *European Journal of Psychology of Education*, 28(3), 841-861. <https://doi.org/10.1007/s10212-012-0143-4>

- Gunnell, K. E., Crocker, P. R., Mack, D. E., Wilson, P. M., & Zumbo, B. D. (2014). Goal contents, motivation, psychological need satisfaction, well-being and physical activity: A test of self-determination theory over 6 months. *Psychology of Sport and Exercise*, 15(1), 19-29. <https://doi.org/10.1016/j.psychsport.2013.08.005>
- Haerens, L., Aelterman, N., Vansteenkiste, M., Soenens, B., & Van Petegem, S. (2015). Do perceived autonomy-supportive and controlling teaching relate to physical education students' motivational experiences through unique pathways? Distinguishing between the bright and dark side of motivation. *Psychology of sport and exercise*, 16, 26-36. <https://doi.org/10.1016/j.psychsport.2014.08.013>
- Häfner, A., Oberst, V., & Stock, A. (2014). Avoiding procrastination through time management: An experimental intervention study. *Educational Studies*, 40(3), 352-360. <https://doi.org/10.1080/03055698.2014.899487>
- Hardcastle, S., Blake, N., & Hagger, M. S. (2012). The effectiveness of a motivational interviewing primary-care based intervention on physical activity and predictors of change in a disadvantaged community. *Journal of behavioral medicine*, 35(3), 318-333. <https://doi.org/10.1007/s10865-012-9417-1>
- Hardcastle, S. J., Fortier, M., Blake, N., & Hagger, M. S. (2017). Identifying content-based and relational techniques to change behaviour in motivational interviewing. *Health psychology review*, 11(1), 1-16. <https://doi.org/10.1080/17437199.2016.1190659>
- Harris, N. N., & Sutton, R. I. (1983). Task procrastination in organizations: A framework for research. *Human Relations*, 36(11), 987-995. <https://doi.org/10.1177/001872678303601102>

- Harriott, J., & Ferrari, J. R. (1996). Prevalence of procrastination among samples of adults. *Psychological Reports*, 78(2), 611-616.
https://www.researchgate.net/publication/232600716_Prevalence_of_Procrastination_among_Samples_of_Adults
- Hettema, J. M., Neale, M. C., Myers, J. M., Prescott, C. A., & Kendler, K. S. (2006). A population-based twin study of the relationship between neuroticism and internalizing disorders. *American journal of Psychiatry*, 163(5), 857-864. <https://doi.org/10.1176/ajp.2006.163.5.857>
- Hussain, I., & Sultan, S. (2010). Analysis of procrastination among university students. *Procedia-Social and Behavioral Sciences*, 5, 1897-1904.
<https://doi.org/10.1016/j.sbspro.2010.07.385>
- Katz, B., Jaeggi, S., Buschkuhl, M., Stegman, A., & Shah, P. (2014). Differential effect of motivational features on training improvements in school-based cognitive training. *Frontiers in human neuroscience*, 8, 242.
<https://doi.org/10.3389/fnhum.2014.00242>
- Kelly, A. C., Zuroff, D. C., Leybman, M. J., Martin, E. A., & Koestner, R. (2008). Satisfied Groups and Satisfied Members: Untangling the Between-and Within-Groups Effects of Need Satisfaction. *Journal of Applied Social Psychology*, 38(7), 1805-1826.
<https://doi.org/10.1111/j.1559-1816.2008.00370.x>
- Kim, K. R., & Seo, E. H. (2015). The relationship between procrastination and academic performance: A meta-analysis. *Personality and Individual Differences*, 82, 26-33.
<https://doi.org/10.1016/j.paid.2015.02.038>

- Klassen, R. M., Krawchuk, L. L., & Rajani, S. (2008). Procrastination of undergraduates: Low self-efficacy to self-regulate predicts higher levels of procrastination. *Contemporary Educational Psychology*, 33(4), 915–931. <https://doi.org/10.1016/j.cedpsych.2007.07.001>
- Klingsieck, K. B. (2013). Procrastination: When good things don't come to those who wait. *European Psychologist*, 18(1), 24. <https://doi.org/10.1027/1016-9040/a000138>
- Klingsieck, K. B., Grund, A., Schmid, S., & Fries, S. (2013). Why students procrastinate: A qualitative approach. *Journal of College Student Development*, 54(4), 397-412. 10.1353/csd.2013.0060
- Koestner, R., Ryan, R. M., Bernieri, F., & Holt, K. (1984). Setting limits on children's behavior: The differential effects of controlling vs. informational styles on intrinsic motivation and creativity. *Journal of personality*, 52(3), 233-248. [10.1111/j.1467-6494.1984.tb00879.x](https://doi.org/10.1111/j.1467-6494.1984.tb00879.x)
- Kok, J. K. (2016). The relationships between procrastination and motivational aspects of self-regulation. *Jurnal Psikologi Malaysia*, 30(1). <http://spaj.ukm.my/ppppm/jpm/article/viewFile/204/166>
- Krijgsman, C., Vansteenkiste, M., van Tartwijk, J., Maes, J., Borghouts, L., Cardon, G., Mainhard, T., & Haerens, L. (2017). Performance grading and motivational functioning and fear in physical education: A self-determination theory perspective. *Learning and Individual Differences*, 55, 202-211. <https://doi.org/10.1016/j.lindif.2017.03.017>
- Lay, C. H., & Schouwenburg, H. C. (1993). Trait Procrastination, Time Management. *Journal of social Behavior and personality*, 8(4), 647-662. <https://search.proquest.com/docview/1292262496?pq-origsite=gscholar&imgSeq=1>

- Lee, E. (2005). The relationship of motivation and flow experience to procrastination in university students. *The Journal of Genetic Psychology*, 166(1), 5-15.
<https://doi.org/10.3200/GNTP.166.1.5-15>
- Legault, L., Green-Demers, I., & Pelletier, L. (2006). Why do high school students lack motivation in the classroom? Toward an understanding of academic amotivation and the role of social support. *Journal of Educational Psychology*, 98(3), 567.
<https://doi.org/10.1037/0022-0663.98.3.567>
- León, J., & Núñez, J. L. (2013). Causal ordering of BPN and well- being. *Social Indicators Research*, 114(2), 243-253. [10.1007/s11205-012-0143-4](https://doi.org/10.1007/s11205-012-0143-4)
- Levesque-Bristol, C., Maybee, C., Parker, L. C., Zywicki, C., Connor, C., & Flierl, M. (2019). Shifting culture: Professional development through academic course transformation. *Change: The Magazine of Higher Learning*, 51(1), 35-41.
<https://doi.org/10.1080/00091383.2019.1547077>
- Levesque, C., Zuehlke, A. N., Stanek, L. R., & Ryan, R. M. (2004). Autonomy and competence in German and American university students: A comparative study based on self-determination theory. *Journal of Educational Psychology*, 96(1), 68.
<https://doi.org/10.1037/0022-0663.96.1.68>
- Loeffler, S. N., Stumpp, J., Grund, S., Limberger, M. F., & Ebner-Priemer, U. W. (2019). Fostering self-regulation to overcome academic procrastination using interactive ambulatory assessment. *Learning and Individual Differences*, 75, 101760.
<https://doi.org/10.1016/j.lindif.2019.101760>

- Lundahl, B. W., Kunz, C., Brownell, C., Tollefson, D., & Burke, B. L. (2010). A meta-analysis of motivational interviewing: Twenty-five years of empirical studies. *Research on social work practice*, 20(2), 137-160. <https://doi.org/10.1177/1049731509347850>
- Lundahl, B., Moleni, T., Burke, B. L., Butters, R., Tollefson, D., Butler, C., & Rollnick, S. (2013). Motivational interviewing in medical care settings: a systematic review and meta-analysis of randomized controlled trials. *Patient education and counseling*, 93(2), 157-168. <https://doi.org/10.1016/j.pec.2013.07.012>
- McFadden, T., Fortier, M. S., & Guérin, E. (2017). Investigating the effects of Physical Activity Counselling on depressive symptoms and physical activity in female undergraduate students with depression: A multiple baseline single-subject design. *Mental Health and Physical Activity*, 12, 25-36. <https://doi.org/10.1016/j.mhpa.2017.01.002>
- McLachlan, S., & Hagger, M. S. (2010). Effects of an autonomy-supportive intervention on tutor behaviors in a higher education context. *Teaching and Teacher Education*, 26(5), 1204-1210. <https://doi.org/10.1016/j.tate.2010.01.006>
- Miller, W. R., & Rollnick, S. (2002). Preparing people for change. *Motivational Interviewing*. Book Review.
- Miller, W. R., & Rollnick, S. (2013). *Motivational interviewing: Helping people change* (3rd ed.). Guilford Press.
- Miller, W. R., & Rollnick, S. (2012). Meeting in the middle: motivational interviewing and self-determination theory. *International Journal of Behavioral Nutrition and Physical Activity*, 9(1), 25. <https://doi.org/10.1186/1479-5868-9-25>

- Miller, W. R., & Rose, G. S. (2009). Toward a theory of motivational interviewing. *American psychologist*, 64(6), 527. <https://doi.org/10.1037/a0016830>
- Milyavskaya, M., & Koestner, R. (2011). Psychological needs, motivation, and well-being: A test of self-determination theory across multiple domains. *Personality and Individual Differences*, 50(3), 387-391. <https://doi.org/10.1016/j.paid.2010.10.029>
- Niemiec, C. P., & Ryan, R. M. (2009). Autonomy, competence, and relatedness in the classroom: Applying self-determination theory to educational practice. *School Field*, 7(2), 133-144. [10.1177/1477878509104318](https://doi.org/10.1177/1477878509104318)
- Nordby, K., Wang, C. E. A., Dahl, T. I., & Svartdal, F. (2016). Intervention to reduce procrastination in first-year students: Preliminary results from a Norwegian study. *Scandinavian Psychologist*, 3. <https://doi.org/10.15714/scandpsychol.3.e10>
- O'Brien, W. K. (2002). Applying the transtheoretical model to academic procrastination. *Dissertation Abstracts International: Section B: The Sciences and Engineering*, 62(11-B), 5359. <https://psycnet.apa.org/record/200295010-384>
- Olafsen, A. H., Deci, E. L., & Halvari, H. (2018). Basic psychological needs and work motivation: A longitudinal test of directionality. *Motivation and Emotion*, 42(2), 178-189. <https://doi.org/10.1007/s11031-017-9646-2>
- Patrick, H., & Williams, G. C. (2012). Self-determination theory: its application to health behavior and complementarity with motivational interviewing. *International Journal of behavioral nutrition and physical Activity*, 9(1), 18. [https://doi.org/10.1186/1479-5868-9-](https://doi.org/10.1186/1479-5868-9-18)

- Patrzek, J., Grunschel, C., & Fries, S. (2012). Academic procrastination: The perspective of university counsellors. *International Journal for the Advancement of Counselling*, 34(3), 185-201. <https://doi.org/10.1007/s10212-012-0143-4>
- Przepiórka, A., Błachnio, A., & Siu, N. Y. F. (2019). The relationships between self-efficacy, self-control, chronotype, procrastination and sleep problems in young adults. *Chronobiology international*, 36(8), 1025-1035.
<https://doi.org/10.1177/0961463X16678251>
- Pychyl, T. A., Lee, J. M., Thibodeau, R., & Blunt, A. (2000). Five days of emotion: An experience sampling study of undergraduate student procrastination. *Journal of social Behavior and personality*, 15(5), 239.
<https://search.proquest.com/docview/1292314750?accountid=14701>
- Rabin, L. A., Fogel, J., & Nutter-Upham, K. E. (2011). Academic procrastination in college students: The role of self-reported executive function. *Journal of clinical and experimental neuropsychology*, 33(3), 344-357.
https://www.researchgate.net/publication/49641657_Academic_procrastination_in_college_students_The_role_of_self-reported_executive_function
- Ratelle, C. F., Larose, S., Guay, F., & Senécal, C. (2005). Perceptions of parental involvement and support as predictors of college students' persistence in a science curriculum. *Journal of family psychology*, 19(2), 286. <https://doi.org/10.1037/0893-3200.19.2.286>
- Reeve, J. (2009). Why teachers adopt a controlling motivating style toward students and how they can become more autonomy supportive. *Educational psychologist*, 44(3), 159-175.
<https://doi.org/10.1080/00461520903028990>

- Reeve, J., Ryan, R. M., Deci, E. L., & Jang, H. (2008). Understanding and promoting autonomous self-regulation: A self-determination theory perspective. *Motivation and self-regulated learning: Theory, research, and applications*, 223-244.
<https://doi.org/10.4324/9780203831076>
- Resnicow, K., & McMaster, F. (2012). Motivational Interviewing: moving from why to how with autonomy support. *International Journal of Behavioral Nutrition and Physical Activity*, 9(1), 19. <https://doi.org/10.1186/1479-5868-9-19>
- Rocchi, M., Pelletier, L., Cheung, S., Baxter, D., & Beaudry, S. (2017). Assessing need-supportive and need-thwarting interpersonal behaviours: The Interpersonal Behaviours Questionnaire (IBQ). *Personality and Individual Differences*, 104, 423-433.
https://www.researchgate.net/publication/307945900_Assessing_need-supportive_and_need-thwarting_interpersonal_behaviours_The_Interpersonal_Behaviours_Questionnaire_IBQ
- Rothblum, E. D., Solomon, L. J., & Murakami, J. (1986). Affective, cognitive, and behavioral differences between high and low procrastinators. *Journal of counseling psychology*, 33(4), 387. <https://doi.org/10.1037/0022-0167.33.4.387>
- Rozental, A., & Carlbring, P. (2014). Understanding and treating procrastination: A review of a common self-regulatory failure. *Psychology*, 5(13), 1488.
<https://doi.org/10.4236/psych.2014.513160>
- Rubak, S., Sandbæk, A., Lauritzen, T., & Christensen, B. (2005). Motivational interviewing: a systematic review and meta-analysis. *Br J Gen Pract*, 55(513), 305-312.
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1463134/>

- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American psychologist*, 55(1), 68.
10.1037/110003-066X.55.1.68
- Ryan, R. M., & Deci, E. L. (2006). Self-regulation and the problem of human autonomy: does psychology need choice, self-determination, and will?. *Journal of personality*, 74(6), 1557-1586. [10.1111/j.1467-6494.2006.00420.x](https://doi.org/10.1111/j.1467-6494.2006.00420.x)
- Ryan, R. M., & Deci, E. L. (2008). A self-determination theory approach to psychotherapy: The motivational basis for effective change. *Canadian Psychology/Psychologie canadienne*, 49(3), 186. <https://doi.org/10.1037/a0012753>
- Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. Guilford Publications.
- Sæle, R.G., Dahl, T.I., Sørli, T., & Friborg, O. (2017). Relationships between learning approach, procrastination and academic achievement amongst first-year university students. *Higher Education* 74, 757–774. <https://doi.org/10.1007/s10734-016-0075-z>
- Scent, C. L., & Boes, S. R. (2014). Acceptance and commitment training: a brief intervention to reduce procrastination among college students. *Journal of College Student Psychotherapy*, 28(2), 144-156. <https://doi.org/10.1080/87568225.2014.883887>
- Schouwenburg, H. C., Lay, C. H., Pychyl, T. A., & Ferrari, J. R. (2004). *Counseling the procrastinator in academic settings*. American Psychological Association.

Schraw, G., Wadkins, T., & Olafson, L. (2007). Doing the things we do: A grounded theory of procrastination. *Journal of Educational psychology*, 99(1), 12.

<https://doi.org/10.1037/0022-0663.99.1.12>

Senécal, C., Julien, E., & Guay, F. (2003). Role conflict and academic procrastination: A self-determination perspective. *European journal of social psychology*, 33(1), 135-145.

<https://doi.org/10.1002/ejsp.144>

Senécal, C., Koestner, R., & Vallerand, R. J. (1995). Self-regulation and academic procrastination. *The journal of social psychology*, 135(5), 607-619.

<https://doi.org/10.1080/00224545.1995.9712234>

Seo, E. H. (2011). The relationships among procrastination, flow, and academic achievement. *Social Behavior and Personality: an international journal*, 39(2), 209-217.

<https://doi.org/10.2224/sbp.2011.39.2.209>

Sheftel, A., Lindstrom, L., & McWhirter, B. (2014). Motivational enhancement career intervention for youth with disabilities. *Advances in School Mental Health Promotion*, 7(4), 208-224. <https://doi.org/10.1080/1754730X.2014.949061>

Sheldon, K. M., & Filak, V. (2008). Manipulating autonomy, competence, and relatedness support in a game-learning context: New evidence that all three needs matter. *British Journal of Social Psychology*, 47(2), 267-283.

<https://doi.org/10.1348/014466607X238797>

Silva, M. N., Markland, D., Minderico, C. S., Vieira, P. N., Castro, M. M., Coutinho, S. R., Santosa, T.C., Matos, M.G., Sardinha, L.B., & Teixeira, P. J. (2008). A randomized controlled trial to evaluate self-determination theory for exercise adherence and weight

control: rationale and intervention description. *BMC public health*, 8(1), 234.

<https://doi.org/10.1186/1471-2458-8-234>

Silva, M.N., Vieira, P.N., Coutinho, S.R., Minderico, C.S., Matos, M.G., Sardinha, L.B., & Teixeira P.J. (2010). Using self-determination theory to promote physical activity and weight control: a randomised controlled trial in women. *Journal of Behavioral Medicine*, 33, 110-122. <https://doi.org/10.1007/s10865-009-9239-y>.

Snape, L., & Atkinson, C. (2016). The evidence for student-focused motivational interviewing in educational settings: a review of the literature. *Advances in School Mental Health Promotion*, 9(2), 119-139.

<https://www.tandfonline.com/doi/full/10.1080/1754730X.2016.1157027>

Solomon, L. J., & Rothblum, E. D. (1984). Procrastination: Frequency and cognitive-behavioral correlates. *Journal of Counseling Psychology*, 31(4), 503–509.

<https://doi.org/10.1037/0022-0167.31.4.503>

Stainton, M., Lay, C. H., & Flett, G. L. (2000). Trait procrastinators and behavior/trait-specific cognitions. *Journal of Social Behavior and Personality*, 15(5), 297.

<https://search.proquest.com/docview/1292314928?accountid=14701>

Stead, R., Shanahan, M. J., & Neufeld, R. W. (2010). “I’ll go to therapy, eventually”: Procrastination, stress and mental health. *Personality and Individual Differences*, 49(3), 175-180. <https://www.psychologytoday.com/files/attachments/41207/ill-go-to-therapy-eventually-stead-shanahan-neufeld-2010.pdf>

- Steel, P. (2007). The nature of procrastination: A meta-analytic and theoretical review of quintessential self-regulatory failure. *Psychological bulletin*, 133(1), 65.
<https://doi.org/10.1037/0033-2909.133.1.65>
- Steel, P. (2010). *The procrastination equation: How to stop putting things off and start getting stuff done*. Random House Canada.
- Steel, P., & Klingsieck, K. B. (2016). Procrastination: Psychological antecedents revisited. *Australian Psychologist*, 51(1), 36-46. <https://doi.org/10.1111/ap.12173>
- Stöber, J., & Joormann, J. (2001). Worry, procrastination, and perfectionism: Differentiating amount of worry, pathological worry, anxiety, and depression. *Cognitive therapy and research*, 25(1), 49-60. <https://doi.org/10.1023/A:1026474715384>
- Strait, G. G., Smith, B. H., McQuillin, S., Terry, J., Swan, S., & Malone, P. S. (2012). A randomized trial of motivational interviewing to improve middle school students' academic performance. *Journal of Community Psychology*, 40(8), 1032-1039.
<https://doi.org/10.1002/jcop.21511>
- Su, Y. L., & Reeve, J. (2011). A meta-analysis of the effectiveness of intervention programs designed to support autonomy. *Educational Psychology Review*, 23(1), 159–188.
https://www.researchgate.net/publication/226547673_A_Meta-analysis_of_the_Effectiveness_of_Intervention_Programs_Designed_to_Support_Autonomy

- Terry, J., Smith, B., Strait, G., & McQuillin, S. (2013). Motivational interviewing to improve middle school students' academic performance: a replication study. *Journal of Community Psychology*, 41(7), 902-909. <https://doi.org/10.1002/jcop.21574>
- Teixeira, P. J., Carraça, E. V., Markland, D., Silva, M. N., & Ryan, R. M. (2012). Exercise, physical activity, and self-determination theory: a systematic review. *International journal of behavioral nutrition and physical activity*, 9(1), 78. <https://doi.org/10.1186/1479-5868-9-78>
- Teixeira, P. J., Marques, M. M., Silva, M. N., Brunet, J., Duda, J. L., Haerens, L., La Guardia, J., Lindwall, M., Lonsdale, C., Markland, D., Michie, S., Molle, A., Ntoumanis, N., Patrick, H., Reeve, J., Richard, R., Sebire, S.J., Standage, M., Vansteenkiste, M., ... & Hagger, M. (2020). A classification of motivation and behavior change techniques used in self-determination theory-based interventions in health contexts. *Motivation Science*. <https://doi.org/10.1037/mot0000172>
- Tice, D. M., & Baumeister, R. F. (1997). Longitudinal study of procrastination, performance, stress, and health: The costs and benefits of dawdling. *Psychological science*, 8(6), 454-458. <https://doi.org/10.1111/j.1467-9280.1997.tb00460.x>
- Toker, B., & Avci, R. (2015). Effect of Cognitive-Behavioral-Theory-Based Skill Training on Academic Procrastination Behaviors of University Students. *Educational Sciences: Theory and Practice*, 15(5), 1157-1168. https://www.researchgate.net/publication/288516693_Effect_of_Cognitive-Behavioral-Theory-based_Skill_Training_on_Academic_Procrastination_Behaviors_of_University_Students

- Trenshaw, K. F., Revelo, R. A., Earl, K. A., & Herman, G. L. (2016). Using self-determination theory principles to promote engineering students' intrinsic motivation to learn. *International Journal of Engineering Education*, 32(3), 1194-207.
<http://selfdeterminationtheory.org/wp->
- Tuckman, B. W., & Sexton, T. L. (1992). Self-believers are self-motivated; self-doubters are not. *Personality and Individual Differences*, 13(4), 425-428.
[https://doi.org/10.1016/0191-8869\(92\)90070-6](https://doi.org/10.1016/0191-8869(92)90070-6)
- Unanue, W., Dittmar, H., Vignoles, V. L., & Vansteenkiste, M. (2014). Materialism and well-being in the UK and Chile: Basic need satisfaction and basic need frustration as underlying psychological processes. *European Journal of Personality*, 28(6), 569-585.
<https://doi.org/10.1002/per.1954>
- Uzun Ozer, B., O'Callaghan, J., Boksztzanin, A., Ederer, E., & Essau, C. (2014). Dynamic interplay of depression, perfectionism and self-regulation on procrastination. *British Journal of Guidance & Counselling*, 42(3), 309-319.
<https://doi.org/10.1080/03069885.2014.896454>
- Vallerand, R. J., Pelletier, L. G., Blais, M. R., Briere, N. M., Senecal, C., & Vallieres, E. F. (1992). The Academic Motivation Scale: A measure of intrinsic, extrinsic, and amotivation in education. *Educational and Psychological Measurement*, 52(4), 1003-1017. <https://doi.org/10.1177/0013164492052004025>
- Vallerand, R. J., Pelletier, L. G., Blais, M. R., Brière, N. M., Senecal, C., & Vallieres, E. F. (1993). On the assessment of intrinsic, extrinsic, and amotivation in education: Evidence

on the concurrent and construct validity of the Academic Motivation Scale. *Educational and psychological measurement*, 53(1), 159-172. [10.1177/0013164493053001018](https://doi.org/10.1177/0013164493053001018)

Van den Broeck, A., Vansteenkiste, M., De Witte, H., & Lens, W. (2008). Explaining the relationships between job characteristics, burnout, and engagement: The role of basic psychological need satisfaction. *Work & stress*, 22(3), 277-294.

<https://doi.org/10.1080/02678370802393672>

Van Eerde, W. (2003). A meta-analytically derived nomological network of procrastination. *Personality and individual differences*, 35(6), 1401-1418.

https://www.researchgate.net/publication/222416181_A_meta-analytically_derived_nomological_network_of_procrastination

Vansteenkiste, M., Lens, W., & Deci, E. L. (2006)b. Intrinsic versus extrinsic goal contents in self-determination theory: Another look at the quality of academic motivation. *Educational psychologist*, 41(1), 19-31.

https://doi.org/10.1207/s15326985ep4101_4

Vansteenkiste, M., Lens, W., De Witte, S., De Witte, H., & Deci, E. L. (2004). The ‘why’ and ‘why not’ of job search behaviour: their relation to searching, unemployment experience, and well-being. *European journal of social psychology*, 34(3), 345-363.

10.1002/ejsp.202

Vansteenkiste, M., & Sheldon, K. M. (2006)a. There's nothing more practical than a good theory: Integrating motivational interviewing and self-determination theory. *British journal of clinical psychology*, 45(1), 63-82. [10.1348/014466505X34192](https://doi.org/10.1348/014466505X34192)

- Vansteenkiste, M., Sierens, E., Soenens, B., Luyckx, K., & Lens, W. (2009). Motivational profiles from a self-determination perspective: The quality of motivation matters. *Journal of Educational Psychology*, 101(3), 671–688. <https://doi.org/10.1037/a0015083>
- Vansteenkiste, M., & Ryan, R. M. (2013). On psychological growth and vulnerability: Basic psychological need satisfaction and need frustration as a unifying principle. *Journal of Psychotherapy Integration*, 23(3), 263. <https://doi.org/10.1037/a0032359>
- Vij, J., & Lomash, H. (2014). Role of motivation in procrastination. *International Journal of Scientific & Engineering Research*, 5(8), 1065-1070.
<https://www.semanticscholar.org/paper/Role-of-Motivation-in-Academic-Procrastination-Vij-Lomash/732078d61a4572953cbd4f6739d52e9d6d8f574f>
- Wagner, C. C., & Ingersoll, K. S. (2012). *Motivational interviewing in groups*. Guilford Press.
- Williams, J. G., Stark, S. K., & Foster, E. E. (2008). Start today or the very last day? The relationships among self-compassion, motivation, and procrastination. *American journal of psychological research*, 4, 37-44. <https://self-compassion.org/wp-content/uploads/publications/scmotivationprocrastination.pdf>
- Williams, G. C., & Deci, E. L. (1996). Internalization of biopsychosocial values by medical students: a test of self-determination theory. *Journal of personality and social psychology*, 70(4), 767.
http://selfdeterminationtheory.org/SDT/documents/1996_WilliamsDeci.pdf
- Zimmerman, B. J. (1990). Self-regulated learning and academic achievement: An overview and analysis. In *Self-regulated learning and academic achievement*, 25(1), 3-17.
https://doi.org/10.1207/s15326985ep2501_2

Appendix A: Consent Forms

General Consent Form for Study 1

Overview

Hello and welcome to our study. This study will examine the university experience of undergraduate students. This study will require you to complete a 30-minute questionnaire regarding your experience as an undergraduate student. If you are a student participating in this study via ISPR, you will receive 1 participation point. If you are participating outside of ISPR, you will be entered into a draw to win a \$50 gift card. Details regarding the gift card are below.

Compensation or Incentive with Gift-Card

To thank you for your contribution to the research project, you will be given the option to enter your name in a draw to win a gift card valued at \$50.

The draw is open to all research participants who enter their name in the draw, regardless of whether they decide to withdraw from further participating in the research project.

Upon completion of the study, a name will be randomly selected amongst those who have entered and the person whose name is drawn will be informed by email. To win the prize, the person must correctly answer a skill testing question. If the person cannot be reached within 14 days from the date of the draw, the prize will be awarded to the second name that is randomly selected and so on until the prize has been awarded. The odds of winning a prize will depend on the number of eligible entries received. The prize must be accepted as awarded or forfeited and cannot be redeemed for cash.

The email that you provide when you enter the draw is collected for the purposes of contacting you if your name is selected in the draw. Your name and the contact information you have provided will be kept confidential and then destroyed once the prizes have been awarded.

We reserve the right to cancel the draw or cancel the awarding of the prize if the integrity of the draw or the research or the confidentiality of participants is compromised. The draw is governed by the applicable laws of Canada.

Confidentiality and Conservation of data:

Names and personal identifying information will not be collected. Emails will be removed from the data file and kept separately. All of the information gathered will remain confidential and used strictly for this study. The data will be kept on a password protected computer in the ADHD and Development laboratory at the University of Ottawa for 5 years.

Funding

This research is funded by the Social Sciences and Humanities Research Council (430-2016-01172).

Risk and Benefits

There is the potential risk of psychological or emotional discomfort associated with questions that require you to reflect upon your academic experience. We believe, however, that this study will provide useful insight to the participants about their university experience

Voluntary Participation

Participating in this project is voluntary. You can end your participation at any time. You do not have to answer any question you do not want to answer. There will be no consequences for you now or in the future if you choose not to participate.

If you have any questions regarding the ethical conduct of this study, you may contact:

Protocol Officer for Ethics in Research University of Ottawa, Tabaret Hall, 550 Cumberland Street, Room 154, Ottawa, ON K1N 6N5

Tel.: (613) 562-5387

Email: ethics@uottawa.ca

You may also contact the researchers directly:**Consent**

I have read and understand the above information. I could print a copy of this form. I agree to participate in this study. Click "yes" to consent to participate. Click "no" to not consent to participate.

☐ Yes

☐ No

This is a list of resources on campus where you can find help if you are feeling overwhelmed, stressed, sad, depressed, or any other mental health concerns.

IF YOU ARE IN CRISIS PLEASE CONTACT ONE OF THE FOLLOWING:

SASS - Student Academic Success Service

100 Marie-Curie Private

(4th Floor, MCE)

Ottawa ON Canada

K1N 1A2

Tel.: 613-562-5101

Ottawa Mental Health Crisis Line (24h) 613-722-6914

Ottawa Distress Centre (24h) 613-238-3311

Crisis Line Ottawa 613-722-6914 or 1-866-996-099

Study 2 Consent Form

PROJECT: Stop Procrastinating on Procrastination! Using Self-Determination Theory and Motivational Interviewing to target Basic Psychological Needs, Academic Motivation, and Academic Procrastination

PRINCIPAL INVESTIGATOR: Maria Rogers, PhD, CPsych

CO-INVESTIGATOR: Rylee Oram, HBA

INFORMATION

You are invited to participate in a study investigating the efficacy of a brief, psychoeducational workshop to help people reduce their procrastination. In this study, participants will be randomly assigned to the intervention or control group. Participants in the intervention group will participate in the procrastination workshop, which consists of attending two, one-hour workshops and participating in dynamic discussion and activities related to their procrastination behaviours, and completing a set of questionnaires online before and after the workshop, which will take approximately 20 minutes. Participants in the control group will be asked to complete the same questionnaires online at the same time as the participants in the intervention group. Participants will be notified when to complete the questionnaires after the initial questionnaire using the email they provide after completing the first set of questionnaires.

The purpose of this study is to determine if the procrastination workshop can help reduce procrastinating behaviour through dynamic discussion about academic procrastination.

RISKS

You will learn about and discuss thoughts and feelings about your procrastination behaviours. You will be encouraged to discuss some of your experiences related to procrastination in detail. These activities may cause some people to feel distressed, worried, sad, or other negative emotions. It may also cause some people to have increases in negative thinking or become more aware of their procrastinating behaviour. You are free to withdraw from the study at any time without consequence. If you are experiencing any negative thoughts or feelings and are concerned about them, you can refer to the list of mental health resources on the University of Ottawa campus that has been provided to you. You may also contact Dr. Maria Rogers, the principal investigator of this study, who is a licensed psychologist, for a free consultation resulting in appropriate referral.

BENEFITS

Participation in this study will help the researchers to determine if this workshop can help university students with their academic procrastination. Your feedback will allow us to tailor the program to better suit the needs of university students. Some people in the intervention group may also learn skills to change their procrastination behaviours. All participants will be compensated with a \$20 gift-card, as well as 2 course credits if recruited via ISPR. You will also be provided a list of mental health resources on the University of Ottawa campus that may be of use to you if you experience any mental health difficulties.

CONFIDENTIALITY

All information you share in the questionnaire and any correspondence (e.g., e-mail or telephone) with Rylee Oram or Dr. Rogers will be kept confidential. Your user ID on this consent form will be the only link to your questionnaire answers and your identifying information on this consent form. Consent forms and questionnaire answers will be stored in separate folders on both this website and Dr. Rogers' laboratory computers, each with a unique password. Computer data may also be backed up on memory sticks, also password-protected. Both Dr. Rogers' laboratory computers and memory sticks will be stored in a locked laboratory. Memory sticks will be stored in a locked filing cabinet within the locked laboratory.

Those who participate in the procrastination workshop may be identified in the workshop either by use of their name or meeting someone there they already know. It is completely your choice how much information you share during the workshop. The facilitator, Rylee Oram, will begin both days of the workshop by explaining the importance of confidentiality and encouraging all participants not to discuss anything that happens in the workshop outside of the workshop.

Also, the workshop will be audio-recorded to assess if the intervention is being delivered correctly. Only the facilitator, Rylee Oram, and a supervisor, will have access to this audio. All results will be reported as group data. Your individual answers will never be identified in any report.

The data will be kept for 10 years after publication, as which point all data files will be deleted from the computer, web server, and their caches.

CONTACT

If you have questions at any time about the study or the procedures, or you experience any adverse effects as a result of participating in this study you may contact the co-investigator, Rylee Oram or the primary investigator, Dr. Maria Rogers. This project has been reviewed and has received ethics approval from the University Research Ethics Board. If you have any questions regarding the ethical conduct of this study, you may contact the Protocol Officer for Ethics in Research, University of Ottawa, Tabaret Hall, 550 Cumberland Street, Room 159, Ottawa, ON K1N 6N5. Tel.: (613) 562-5387
Email: ethics@uottawa.ca

PARTICIPATION

Your participation in this study is voluntary; you may decline to participate without penalty. If you decide to participate, you may withdraw from the study at any time without penalty and without loss of benefits to which you are otherwise entitled. If you withdraw from the study before data collection is completed you can ask that your data be destroyed. You also have the right to no answer any questions you do not feel comfortable answering and still remain in the study.

FEEDBACK AND PUBLICATION

The data obtained from this study may be used to create a peer-reviewed publication and/or to be presented at a scholarly conference of professionals. If you wish to review your questionnaire answers or are interested in a copy of the results of the study, please contact Rylee Oram.

CONSENT

I have read and understand the above information. I have received a copy of this form. I agree to participate in this study. Click "yes" to consent to participate. Click "no" to not consent to participate.

☐ Yes

☐ No

This is a list of resources on campus where you can find help if you are feeling overwhelmed, stressed, sad, depressed, or any other mental health concerns.

IF YOU ARE IN CRISIS PLEASE CONTACT ONE OF THE FOLLOWING:

SASS - Student Academic Success Service

100 Marie-Curie Private

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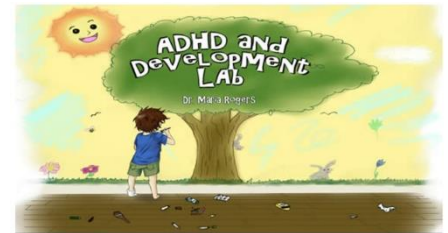
Appendix B: Recruitment Texts**Study 1 ISPR Recruitment Text**

Study Name: A Study on Basic Psychological Needs, Academic Motivation, and Academic Functioning

Description: This study will examine the university experience of students. This study will require you to complete a 30-minute questionnaire regarding your experience as an undergraduate student. You will be required to complete the survey within two weeks. After two weeks, you will be unable to access the survey to complete it. For this reason, we encourage you to complete the survey as soon as possible after you begin it.

Study 1 Recruitment Poster

- **Are you an undergraduate student?**
- **Are you between the ages of 18-25?**
- **If you answered yes to either of these questions, Dr. Maria Rogers is interested in hearing your experiences at university.**



- This online study by Dr. Maria Rogers will be examining the university experience of undergraduate students.
- This study will require you to complete a 30-minute online questionnaire regarding your experience as an undergraduate student.
- When you participate in this study, you will be entered into a draw for a **\$50 gift-card!**
- If you would like to hear more about this study, please contact for more information.

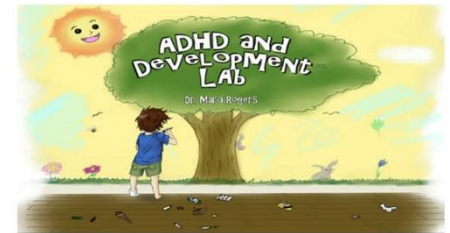
Study 2 ISPR Recruitment Text

Study Name: Stop Procrastinating on Procrastination! Using Self-Determination Theory and Motivational Interviewing to target Basic Psychological Needs, Academic Motivation, and Academic Procrastination

Description: The aim of this study is to test the efficacy of a brief, psychoeducational workshop to help people reduce their procrastination. In this study, participants will be randomly assigned to the intervention or control group. Participants in the intervention group will participate in the procrastination workshop, which consists of attending two, one-hour workshops and participating in dynamic discussion and activities related to their procrastination behaviours, and completing a set of questionnaires online before and after the workshop, which will take approximately 20 minutes. Participants in the control group will be asked to complete the same questionnaires online at the same time as the participants in the intervention group. Participants will be notified when to complete the questionnaires after the initial questionnaire using the email they provide after completing the first set of questionnaires.

Study 2 Recruitment Poster

- Are you an undergraduate student?
- Are you between the ages of 18-25?
- Do you find yourself procrastinating significantly on school-related tasks?
- If you answered yes to either of these questions, Dr. Maria Rogers is interested in hearing your experiences at university.



- This online study by Dr. Maria Rogers will be testing the efficacy of a procrastination workshop!
- This study will require you to participate in the workshop, as well as complete a number of online questionnaires regarding your experience as an undergraduate student.
- When you participate in this study, you will receive a **\$50 gift-card!**
- If you would like to hear more about this study, please contact for more information.

Appendix C: Questionnaires included in Study

Basic Psychological Need Satisfaction and Frustration – Work Domain

Instructions: The following questions concern your feelings about your job during the PAST 4 WEEKS. Please indicate how much you agree with each of the following statements given your experiences on this job. Remember that your supervisor will never know how you responded to the questions. Please use the following scale in responding to the items.

1	2	3	4	5	6	7
strongly			neutral			strongly
disagree						agree

1. At work, I feel a sense of choice and freedom in the things I undertake.
2. I feel excluded from the group I want to belong to at work.
3. I feel confident that I can do things well on my job.
4. I feel that the people I care at work about also care about me.
5. Most of the things I do on my job feel like “I have to”.
6. When I am at work, I have serious doubts about whether I can do things well.
7. I feel that my decisions on my job reflect what I really want.
8. I feel that people who are important to me at work are cold and distant towards me.
9. At work, I feel capable at what I do.
10. I feel forced to do many things on my job I wouldn’t choose to do.
11. I feel disappointed with my performance in my job.
12. I feel connected with people who care for me at work, and for whom I care at work.
13. I feel my choices on my job express who I really am.
14. When I am at work, I feel competent to achieve my goals.
15. I feel pressured to do too many things on my job.
16. At work, I feel close and connected with other people who are important to me.
17. I feel insecure about my abilities on my job.
18. My daily activities at work feel like a chain of obligations.
19. I feel I have been doing what really interests me in my job.
20. I have the impression that people I spend time with at work dislike me.
21. In my job, I feel I can successfully complete difficult tasks.
22. I feel the relationships I have at work are just superficial.
23. When I am working I feel like a failure because of the mistakes I make.
24. I experience a warm feeling with the people I spend time with at work.

ACADEMIC MOTIVATION SCALE – COLLEGE VERSION (AMS-C 28)**WHY DO YOU GO TO COLLEGE?**

Using the scale below, indicate to what extent each of the following items presently corresponds to one of the reasons why you go to college?

Does not correspond at all	Corresponds a little	Corresponds moderately	Corresponds a lot	Corresponds exactly
1	2	3	4	5

WHY DO YOU GO TO COLLEGE?

1. Because with only a high-school degree I would not find a high-paying job later on.	1	2	3	4	5
6 7					
2. Because I experience pleasure and satisfaction while learning new things.	1	2	3	4	5
6 7					
3. Because I think that a college education will help me better prepare for the career I have chosen.	1	2	3	4	5
6 7					
4. For the intense feelings I experience when I am communicating my own ideas to others.	1	2	3	4	5
6 7					
5. Honestly, I don't know; I really feel that I am wasting my time in school.	1	2	3	4	5
6 7					
6. For the pleasure I experience while surpassing myself in my studies.	1	2	3	4	5
6 7					
7. To prove to myself that I am capable of completing my college degree.	1	2	3	4	5
6 7					
8. In order to obtain a more prestigious job later on.	1	2	3	4	5
6 7					
9. For the pleasure I experience when I discover new things never seen before.	1	2	3	4	5
6 7					
10. Because eventually it will enable me to enter the job market in a field that I like.	1	2	3	4	5
6 7					

11. For the pleasure that I experience when I read interesting authors.	1	2	3	4	5
6 7					
12. I once had good reasons for going to college; however, now I wonder whether I should continue.	1	2	3	4	5
6 7					
13. For the pleasure that I experience while I am surpassing myself in one of my personal accomplishments.	1	2	3	4	5
6 7					
14. Because of the fact that when I succeed in college I feel important.	1	2	3	4	5
6 7					
15. Because I want to have "the good life" later on.	1	2	3	4	5
6 7					
16. For the pleasure that I experience in broadening my knowledge about subjects which appeal to me.	1	2	3	4	5
6 7					
17. Because this will help me make a better choice regarding my career orientation.	1	2	3	4	5
6 7					
18. For the pleasure that I experience when I feel completely absorbed by what certain authors have written.	1	2	3	4	5
6 7					
19. I can't see why I go to college and frankly, I couldn't care less.	1	2	3	4	5
6 7					
20. For the satisfaction I feel when I am in the process of accomplishing difficult academic activities.	1	2	3	4	5
6 7					
21. To show myself that I am an intelligent person.	1	2	3	4	5
6 7					
22. In order to have a better salary later on.	1	2	3	4	5
6 7					
23. Because my studies allow me to continue to learn about many things that interest me.	1	2	3	4	5
6 7					
24. Because I believe that a few additional years of education will improve my competence as a worker.	1	2	3	4	5
6 7					
25. For the "high" feeling that I experience while reading about various interesting subjects.	1	2	3	4	5
6 7					

- | | | | | | |
|---|---|---|---|---|---|
| 26. I don't know; I can't understand what I am
doing in school. | 1 | 2 | 3 | 4 | 5 |
| 6 7 | | | | | |
| 27. Because college allows me to experience a
personal satisfaction in my quest for excellence
in my studies. | 1 | 2 | 3 | 4 | 5 |
| 6 7 | | | | | |
| 28. Because I want to show myself that I can succeed
in my studies. | 1 | 2 | 3 | 4 | 5 |
| 6 7 | | | | | |

Procrastination Assessment Scale for Students (PASS)

Areas of Procrastination

For each of the following activities, please rate the degree to which you delay or procrastinate. Rate each item on an “a” to “e” scale according to how often you wait until the last minute to do the activity. Then indicate on an “a” to “e” scale the degree to which you feel procrastination on that task is a problem. Finally, indicate on an “a” to “e” scale the degree to which you would like to decrease your tendency to procrastinate on each task.

I. WRITING A TERM PAPER

1. To what degree do you procrastinate on this task?

Never Procrastinate	Almost Never	Sometimes	Nearly Always	Always Procrastinate
a	b	c	d	e

2. To what degree is procrastination on this task a problem for you?

Not At All a Problem	Almost Never	Sometimes	Nearly Always	Always a Problem
a	b	c	d	e

3. To what extent do you want to decrease your tendency to procrastinate on this task?

Do Not Want to Decrease		Somewhat		Definitely Want to Decrease
a	b	c	d	e

II. STUDYING FOR EXAMS

4. To what degree do you procrastinate on this task?

Never Procrastinate	Almost Never	Sometimes	Nearly Always	Always Procrastinate
a	b	c	d	e

5. To what degree is procrastination on this task a problem for you?

Not At All	Almost Never	Sometimes	Nearly Always	Always
------------	--------------	-----------	---------------	--------

Do Not Want to Decrease		Somewhat		Definitely Want to Decrease
a	b	c	d	e

V. ATTENDANCE TASKS: MEETING WITH YOUR ADVISOR, MAKING AN APPOINTMENT WITH A PROFESSOR

13. To what degree do you procrastinate on this task?

Never Procrastinate	Almost Never	Sometimes	Nearly Always	Always Procrastinate
a	b	c	d	e

14. To what degree is procrastination on this task a problem for you?

Not At All a Problem	Almost Never	Sometimes	Nearly Always	Always a Problem
a	b	c	d	e

15. To what extent do you want to decrease your tendency to procrastinate on this task?

Do Not Want to Decrease		Somewhat		Definitely Want to Decrease
a	b	c	d	e

VI. SCHOOL ACTIVITIES IN GENERAL

16. To what degree do you procrastinate on this task?

Never Procrastinate	Almost Never	Sometimes	Nearly Always	Always Procrastinate
a	b	c	d	e

17. To what degree is procrastination on this task a problem for you?

Not At All a Problem	Almost Never	Sometimes	Nearly Always	Always a Problem
a	b	c	d	e

18. To what extent do you want to decrease your tendency to procrastinate on this task?

Do Not Want
to Decrease

a

b

Somewhat

c

d

Definitely
Want to Decrease

e

Client Evaluation of Counseling

Please circle the number below for each statement relating to your **most recent session** with your counselor.

In this session did your counselor:	Not at All	A Little	Sometime	A Great Deal	Always
1. Help you to talk about changing your behavior.	1	2	3	4	5
2. Make you talk about something you didn't want to discuss.	1	2	3	4	5
3. Help you discuss your need to change your behavior.	1	2	3	4	5
4. Help you discuss the pros and cons of your behavior.	1	2	3	4	5
5. Argued with you to change your behavior	1	2	3	4	5
6. Help you feel hopeful about changing your behavior	1	2	3	4	5
7. Act as a partner in your behavior change.	1	2	3	4	5
8. Help you recognize the need to change your behavior.	1	2	3	4	5
9. Tell you what to do.	1	2	3	4	5
10. Help you feel confident in your ability to change your behavior.	1	2	3	4	5
11. Act as an authority on your life.	1	2	3	4	5

Satisfaction Questionnaire

Thank you for participating in the Procrastination Workshop! We would like to know what you thought of the workshop. Please read the statements below and mark the box that reflects your answers.

	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
1. After the workshop, I felt in control of my procrastinating behaviour.	☐	☐	☐	☐	☐
2. After the workshop, I felt I had the ability to change my procrastinating behaviours.	☐	☐	☐	☐	☐
3. During the workshop, I felt supported by my peers.	☐	☐	☐	☐	☐
4. I participated in the workshop by listening, asking and answering questions, and engaging in discussions.	☐	☐	☐	☐	☐
5. Reflecting on my values and goals was helpful.	☐	☐	☐	☐	☐
6. I will use my change plan to help change my behaviour.	☐	☐	☐	☐	☐
7. This workshop motivated me to change my behaviour.	☐	☐	☐	☐	☐

**8. I feel confident and ready to change my
behaviour.**

☐	☐	☐	☐	☐
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

9. I felt I could relate to the group leader.

☐	☐	☐	☐	☐
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

**10. The group leader and I worked together to
set goals.**

☐	☐	☐	☐	☐
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

11. The group leader and I respected each other.

☐	☐	☐	☐	☐
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

12. The group leader valued my opinion.

☐	☐	☐	☐	☐
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

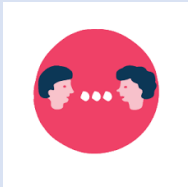
13. Overall, I am satisfied with this experience.

☐	☐	☐	☐	☐
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Appendix D: Workshop Protocol**Workshop 1**

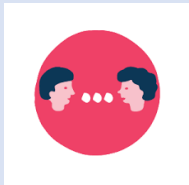
Activity	Details	MI Stage	Workshop Phase	MI concepts/strategies (Miller & Rollnick, 2013; Wagner & Ingersoll, 2012)
Introduction (~2 minutes)	Hi everyone, welcome to the procrastination workshop! My name is Rylee and I am a 4 th year experimental psychology PhD student. I want to thank everyone for coming, as I know there are a lot of other things you could be doing right now. In this workshop, we will be discussing academic procrastination, why we do it, and how we might begin to work on it. This group will be a bit different than other groups you may have participated in. We are going to work together. I will not be lecturing you guys or telling you what you need to do. Essentially, I am here to support you guys and guide discussion so that you can figure out what will work best for you guys and your behaviours. Most	<i>ENGAGING STAGE</i>	Engaging the Group Guiding principles: Take a client-centered perspective, focus on positive, bring group into the present	The purpose of this is to familiarize the participants with the format of the workshop. We want to make sure that the participants understand we are not there to force them to change, rather, we are partners moving in a positive direction and towards change.

	importantly, while I may be sharing some knowledge and skills with you, you are the experts on your own behaviour. I won't be forcing you to do anything you don't want to, or telling what you NEED to do. How does that sound?			
Confidentiality (~2 minutes)	In this workshop, we will be discussing academic procrastination, why we do it, and how we might begin to work on it. This is a private, confidential group, which means that I won't be sharing anything that you guys say with my supervisor, other students, or members of faculty. This also means that we won't discuss anything that people say in here with anyone else. It is okay to talk about today's topics with other people once you leave, but it is not okay to discuss who said what. Can we agree to that? Also, in order for the group to be a safe, respectful, purposeful place, we need some guidelines about what we'll do and what we won't do in here. What guidelines do you guys think would be helpful to provide that type of environment?			We elicit group guidelines from the participants to get them talking and as a means of warming them up for more sensitive topics. This also provides participants with a bit of ownership and control over the group. Finally, this helps facilitators manage negative behaviours within the groups, as members may be more sensitive to violations of their own guidelines.

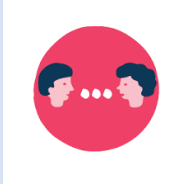
	Elicit Feedback  Tip: Try to validate their thoughts by adding to the power-point slide. <i>Provide examples if need be (respecting each others' opinions, no interrupting, making sure everyone has a chance to talk, no negativity to one another).</i> Awesome! So everyone please keep those guidelines in mind while we are in the workshop!			
You decide how to use the information (~1 minute)	Please keep in mind that it is up to you guys to decide how you want to use the information and you are more than welcome to ask me any questions if something isn't clear or if you want to add a comment. I know that you guys can offer a lot of important input, so I encourage you to do so!			
Ice Breaker (3 minutes)	Alright, so we are going to start off the workshop with a quick icebreaker. I'm sure			Because this is a discussion-based workshop, it is important that

	many of you are familiar with this activity, as it is nice a way to learn a bit more about everyone in the workshop. Given that we will be discussing and sharing, it is important to get to know one another a bit more. We will go around the room and say our names and an interesting fact about ourselves – or just a fact – really whatever you want, as well as a goal you have for this workshop!			each participant is familiar with one another. This will allow them to engage with one another comfortably. This activity also establishes a positive group dynamic that focuses on self-efficacy.
What is procrastination? (5 minutes)	I'm going to start the actual workshop off with why we're all here. Everyone in this workshop indicated that they procrastinate. Procrastination is a very natural behaviour that has been described as early as 800 B.C. Everyone procrastinates, all over the world, at every age. How would you guys define procrastination? *Elicit Feedback*  Alright, so many of you touched on the main idea of procrastination.	FOCUSING STAGE		Throughout the introduction to procrastination, we will be using open-ended questions, affirmations, reflections, and summaries when eliciting feedback from the participants. These are techniques used in MI to engage with participants and foster communication, known as OARS. These are foundational skills for mutual understanding.

	That's great. That shows that you guys understand the behaviour and recognize it when it is happening which is important. The term "procrastination" refers to delaying tasks you consider as urgent or necessary and doing something else instead, the substitutional work having lower priority and being less essential. A major distinction we want to make is that procrastination and delay are different. Delay is part of structuring and prioritizing, whereas procrastination is needless voluntary postponement of tasks undertaken in the knowledge that it may be harmful to yourself in regard to your performance or feelings. This is an important distinction because sometimes delay is important. For example, if you have a paper deadline before another one, it is sensible to delay the other paper that has a more distant deadline. When we refer to procrastination, we are referring to those times you keep watching Netflix, even			
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	though you know you have a paper due the next day!			
What is academic procrastination? (~2 minutes)	Academic procrastination is essentially procrastination in the academic context. It is often restricted to the tasks and activities related to learning and studying. It is defined as the act of voluntarily delaying the intended course of study-related behaviours.			
What percentage of students procrastinate? (3-5 minutes)	What percentage of students do you guys think procrastinate? <i>Provide a multiple-choice question with varying percentages.</i> *Elicit Feedback*  So between 70-95% of students procrastinate, according to previous research. Students actually have one of the highest rates of procrastination. This suggests that you are not alone!		Exploring Perspectives and Norms	In this portion of the workshop, we begin to explore the participants' perceptions of prevalence and social norms related to procrastination. Previous MI interventions (Chan et al., 2007) have used information or statistics specific to the population they are working with for this purpose (e.g., drinking behaviours in the U.S.). For our workshop, we will detail the prevalence of procrastination broadly in

				college students and then move into statistics at the University of Ottawa. Providing a multiple-choice question generates group dialogue in a non-threatening and non-confrontational manner.
How much do students at Uottawa procrastinate? (3-5 minutes)	<i>Provide a bar graph showing information regarding the prevalence of procrastination at the university.</i> When asked how often students procrastinated on school-related tasks, the majority (88%) of students indicated they procrastinated at least sometimes. How do these statistics make you feel? Do you think that these statistics are in line with your peers/friends? *Elicit Feedback*  Tip: If students say that it makes them feel as			We use the discussion of others' behaviour as a foundation for participants to begin discussing their own behaviours. Additionally, it may allow us to explore discrepancies or ambivalence regarding their behaviours.

	though procrastination isn't that big of a deal and everyone does it, discuss the percentage of students who want to change their behaviour (>90%), indicating that although a lot of people do it, a lot of people recognize it is not necessarily a healthy or helpful behaviour.			
What about you? (5-7 minutes)	Do you think those statistics represent you as well? What about your behaviours - do they fit those statistics? *Elicit Feedback* 			We want to begin to explore the participants' behaviour by comparing it to the statistics, as well as opening a discussion about their own behaviours.
Reasons for Procrastination (5 minutes)	A lot of you mentioned you procrastinated a fair amount when asked about where your behaviour would fall compared to those statistics. What are some of the reasons you think you might procrastinate? *Elicit Feedback* 			This discussion allows us to delve into some of the roadblocks associated with change. This information can be used in the second workshop when addressing strategies that could work in reducing procrastination. Furthermore, it

	People procrastinate for many different reasons, and some of you guys touched on a few. Personality traits (i.e., neuroticism) can lead to higher levels of procrastination. Situational characteristics such as stress, time constraints, or context may also play a role in procrastination. Self-regulation is another reason we may procrastinate. What do all of these things have in common? What is difference between those three and the last reason listed? *Elicit Feedback*  Exactly! Many of these reasons feel a bit out of our control sometimes and may make us feel discouraged when it comes to changing our behaviour. Our focus in this workshop is to work on things we can change. So what is in our control? To an extent, our motivation is in our			allows the participants to relate to one another and become more comfortable discussing their behaviours.
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	control. Often thinking about our goals and values can motivate us and push us past procrastination behaviours. That is what we will be targeting in our next discussion.			
Thoughts on Information (~1 minute)	How do you guys feel about the information so far? Has it been helpful?			Eliciting feedback reinforces the idea that the participants' opinions are important to us. Additionally, it allows us to reflect on the effectiveness of elements of the workshop.
Goals and Values Activity (10 minutes)	I want you guys to take a minute or two to think about three important academic goal you may have. Ideally, these goals would be specific, measurable, achievable, relevant, and time-bound. Here is some scrap paper and pens to write your goals down. <i>Provide a couple minutes for students to write goals down.</i> Alright, what were your goals?	EVOKING STAGE	Identifying Goals, Values, and Reasons for Change Guiding Principles: Focus on positives, develop discrepancy, accept defensiveness, focus on future	One way to appreciate another individual's motivations is to understand their core goals and values. When basic needs are lacking, it may be difficult for an individual to think about their future. Exploring potential goals provide participants with an opportunity to broaden their perspective and

	Elicit Feedback  What values play a role in those goals? For example, knowledge (to learn and contribute valuable knowledge) may be a value for you. Or maybe purpose (to have meaning and direction in your life) may be one. *Elicit Feedback*  What does that value mean to you? When has it been helpful in your life?			look toward the future. Values also play an integral role in motivation. Most of us fall short of our values due to day to day human experience, however, we don't frequently reflect when we deviate from those values. Taking the time to reflect on the discrepancy between our goals, values, and behaviours can be a powerful, eye-opening activity. It can be somewhat uncomfortable to become aware of dissonance, and, thus, it is important that this activity is filled with affirmations, respect, and acceptance. This activity also promotes engagement, which is key for
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				a healthy alliance with the facilitator.
Goals & Values VS. Procrastination (5-7 minutes)	How do you think your procrastination affects your goals? Explain how your procrastination behaviours aren't in line with some of your values. *Elicit Feedback*  The point of this activity is for you guys to see the discrepancy between your goals and values and your behaviours. How did it make you feel? What have you realized by reflecting on these?			This discussion continues the discussion of perceived-value-behaviour inconsistencies. The goal here is to move from thinking about goals and values broadly to the narrow focus of the relationship between goals, values, and procrastination. Due to the nature of this activity, it is essential to use the OARS tools to create a safe and supportive atmosphere.
Rulers: Confidence and Importance (10 minutes)	Despite all of these goals and the advantages in changing our behaviour, it seems that procrastination may still be a hard habit to kick for many of us. There are a couple things that are important when it comes to changing behaviour such as the importance of the		Contemplating Importance and Confidence	Because it is important to bolster participants' sense of self-efficacy, we end this session on the exploration of the importance and confidence of changing their behaviours. We

	change and our confidence in making that change. We're going to an activity now where we'll think about these things, I'd like everyone to get up out of their seats. Essentially what we'll be doing is arranging ourselves physically on a likert scale. Let's say the one side of the room is a 1 and the other side is a 10. I want you guys to situate yourselves where you feel you are in response to my question. My second question is: How important is it to you to change your procrastination behaviours? <i>Ask students what their number means to them, why are they a 5 and not 2? What could get them from a 5 to a 6?</i> Tip: Try to stay positive to encourage and foster confidence. Do not ask them why they are a 5 and not a 6. Instead, try to put a positive spin on things, even if they are a 0. *Elicit Feedback*			want to encourage the participants to make active decisions to not engage in the behaviour, engage in a lower level of the behaviour, or to engage in a different behaviour. By ending on this activity, participants may have an increased sense of control over their behaviours. This may allow them to be more mindful of their procrastination behaviours during the time between the first and second session.
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	 Alright, now I want to know how confident you feel in making changes related to your procrastination? Think about your own personal procrastination and your confidence in making a positive change. <i>Ask similar questions as previous ruler.</i>			
Reflection (~1 minute)	Did you feel that was helpful in showing you guys that you all feel fairly confident in tackling these behaviours? You all indicated you had successes or skills that you've used in the past, so you can feel good about those and put them to use!			
Wrap Up (~1 minute)	So today we talked about a lot of things including what procrastination is, the prevalence, how much we procrastinate, why we do it, some of our goals and values, and our confidence/importance of changing. What I want you to do over the next week is			This allows the facilitator the opportunity to summarize what was discussed in the workshop, which is one of the main communication tools used in MI.

	pay close attention to your procrastination. For example, if you want to you can even track your procrastination and think about why you're procrastinating when you are! Next session we will really dive into the instances when you do procrastinate. Thank you so much for coming today guys and good luck until I see you next week! Same time and place as today!			
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Workshop 2

Activity	Details	MI Stage	Workshop Phase	MI concepts/strategies
Introduction/Recap (3-5 minutes)	Hi guys! Welcome to your second session of the workshop. In this session, we're going to try to dissect your procrastination a bit more by discussing times where we did procrastinate, as well as times when we didn't procrastinate!		Guiding principles of this whole session: focus on actions, guide members to ask for what they need, support self-efficacy, use the past to focus on the future	

	How was everyone's last week? How many of you guys procrastinated? *Elicit Feedback*  <i>Allow each participant to discuss their week and if they did/didn't procrastinate.</i>			
Think of a time when you procrastinated... (5-7 minutes)	Some of you guys mentioned you did procrastinate. Even if you didn't procrastinate, I want you to think of a specific time when you did procrastinate. *Elicit Feedback*  <i>Ask all of the participants to explain in detail their experience with procrastinating. Ask questions such as, "Why do you think you procrastinated?"</i>	Evoking Stage	Exploring Procrastination Behaviour	This discussion allows us to dissect the participants' procrastination behaviours as a means of understanding their motivations. First, we discuss their behaviour broadly and begin asking why they procrastinated in this context. After discussing why they procrastinated, we ask about the benefits of procrastinating in this situation. This allows us to build momentum toward change, as we will

	<i>How did it make you feel? What were the benefits of procrastination? What are some of the cons to changing? What are the cons to staying the same? What are the benefits to changing?</i> <i>What were some barriers present? What are some goals or values that may have been helpful to reflect on? What is one thing you would have changed in that situation to be more aligned with one of your values?</i> Tip: Try to end on a positive note, even though they are discussing a time when they did procrastinate.			then explore the positive elements of changing. This is known as a “decisional balance exercise”. This discussion can also include identifying barriers that exist when we are trying to change our behaviours. Participants have a chance to reflect deeply on these barriers so that we can come up with some strategies to overcome them as a group. This also gives us an opportunity to tie in their goals and values.
Think of a time when you didn't procrastinate... (5-7 minutes)	Now I want you guys to think of a time when you didn't procrastinate. What was different from the time that you did procrastinate? *Elicit Feedback*		Exploring Past Success and Strengths	This discussion focuses on success stories for the participants to explore their own strengths, skills, and strategies. Eliciting success stories is a strategy that can broaden members' perspectives by connecting them to

	 What is a barrier you overcame in this situation? What was a strategy that you used? How do those strategies align with your goals or values?			past successes, boosting their confidence about their current possibilities for change, and inspiring new change attempts.
Strategies Activity (5-7 minutes)	Some of you guys mentioned some really great strategies that you've used in the past and worked for you. Let's make a list of them and have a bit of a discussion about why they may have worked. Which ones have you guys used before? Which ones are new and might be helpful for you? *Elicit Feedback*  Tip: Use this open discussion as an opportunity to elicit			Sharing strategies between group members can be a useful exercise to increase group cohesiveness and task-interdependence, information exchange, and imitative behaviour.

	each participant's vision. Try to link the members' strategies to others. <i>If students are not providing many strategies you can ask for permission to provide them with suggestions, "Would it be okay if I suggested some strategies?"</i>			
How can others help us? (5 minutes)	Now that we've talked about strategies you guys can use, are there things that might be helpful for others to do to help you? For example, what can your friends do to help? What can the university provide for you? *Elicit Feedback* 			This allows participants to reflect on the ways others can support their behaviour change. By reflecting on this, our aim is to increase their confidence in changing. Furthermore, it reinforces the idea that there are individuals who will support them.
Creating a change plan (10-15 minutes)	Wow, you guys have impressed me and come a long way from when we first stepped foot in here. Most of you have clearly identified some changes you want to		Moving into Action	A change plan is a helpful tool when it retains the core spirit and skills of MI. It will build on the engagement, focusing, and evoking that has

	make and have really embraced the activities and discussions that we've had. This tells me that you've taken the steps to get ready for changing. How many of you feel ready to make a change? *Elicit Feedback*  <i>If there are students who do not feel ready, you can discuss how this can be a draft of a plan that can be used when they do feel ready. Additionally, they can draft it as a statement of what they need to think about first and use that as their target.</i> One of the final things we can do together is create a clear statement of commitment to your plan. I have a sheet here that that will ask about some			been developed up until this point. Change plans strengthen a commitment to change, as they move from a general intention to a specific implementation plan.
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	of the things we've discussed. I want you all to fill it out and then we'll discuss what you all wrote. <i>Reflect and debrief through discussion.</i>			
Rulers revisited (5 minutes)	Alright guys, now that we have our change plans, I want to quickly revisit our confidence in making a change. Most of you guys were between ____ and _____. Where do you think you are now? *Elicit Feedback*  <i>If students haven't made any change, ask about why they think that is and what one thing they can do to move towards a change might be.</i>			Similarly, to session 1, this session will end on a confidence ruler. We want to end on a positive, self-efficacious note.
Wrap up (2 minutes)	I want to thank you guys for sharing your experiences and thoughts with me. I hope you had learned as much as I have learned! If you take anything away			Affirmations are explicitly used during the wrap up in order to bolster the participants' confidence in both their abilities.

	from this workshop, it is that your opinion is valued, and you are often more capable than you believe you are! <i>You can use any affirmation at the end, but you want to leave the students feeling positive about their abilities. Try to be as specific to the group as possible.</i> <i>Provide any further details regarding the process (e.g., post-questionnaire information and follow-up)</i>			
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Appendix E: Change Plan Sheet**Change Plan**

My goal is to (specific, measurable, attainable, result-oriented, time-based; e.g. stop procrastinating on my readings):

The reasons why I want to make this change:

- 1) _____
- 2) _____
- 3) _____

The steps I plan to take in changing are:

- 1) _____
- 2) _____
- 3) _____

The ways other people can help me are:

- 1) _____
- 2) _____
- 3) _____

Possible obstacles and how I will overcome them:

Obstacles	Overcome/Solution

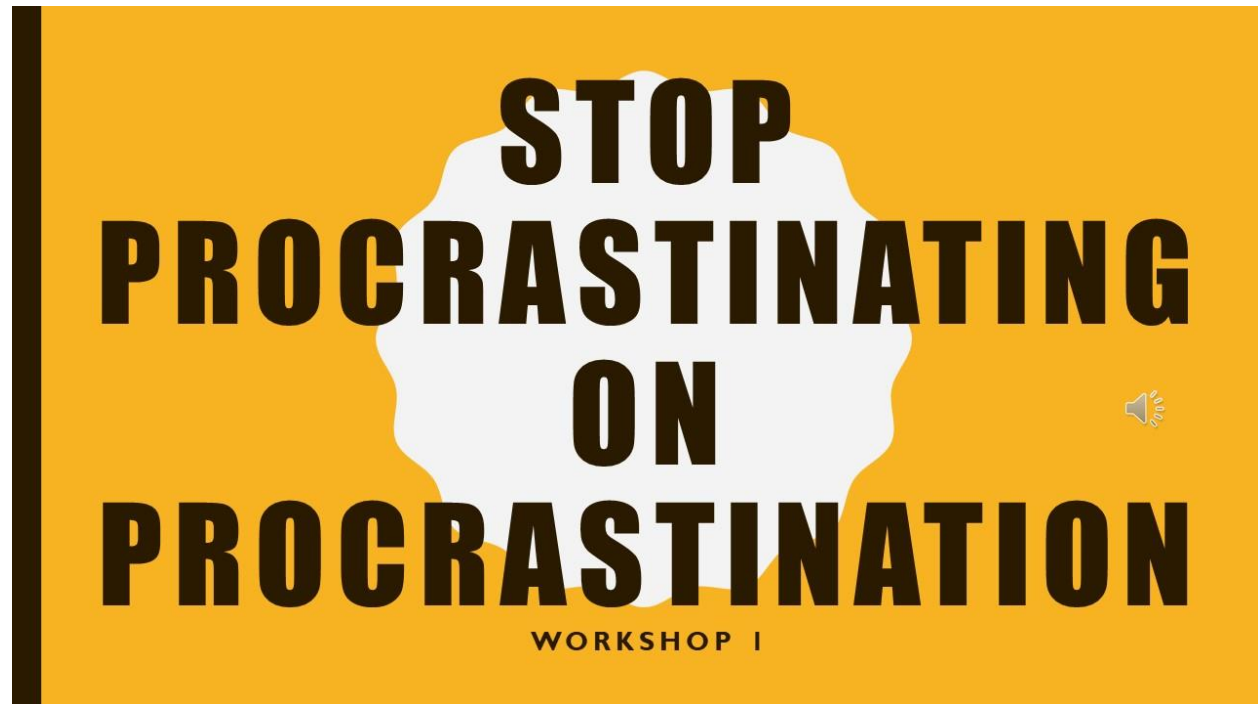
How I will know if my plan is working:

Self-Reward for Achieving Goal:

I _____ agree to follow my state goal plan for the rest of the semester. **I**
will start following my plan _____, _____, _____.

Student Signature _____ Facilitator Signature _____

Appendix F: Intervention Slides



"ICE BREAKER"

- Say your name, interesting fact, and a goal you have in this workshop!

A photograph of two dogs on a green lawn. In the foreground, a light-colored dog with large ears is sitting and looking at the camera with its mouth open. Behind it, a smaller brown dog is also looking at the camera.

BEFORE WE GET STARTED.... RULES!

- Confidentiality
- Respect
- What else?

WHAT IS PROCRASTINATION?

- The term “procrastination” refers to delaying tasks you consider as urgent or necessary and doing something else instead, the substitutional work having lower priority and being less essential.
- Delay is part of structuring and prioritizing, whereas procrastination is needless voluntary postponement of tasks undertaken in the knowledge that it may be harmful to yourself in regard to your performance or feelings.

WHAT IS ACADEMIC PROCRASTINATION?

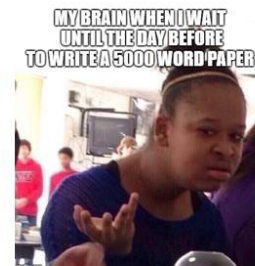
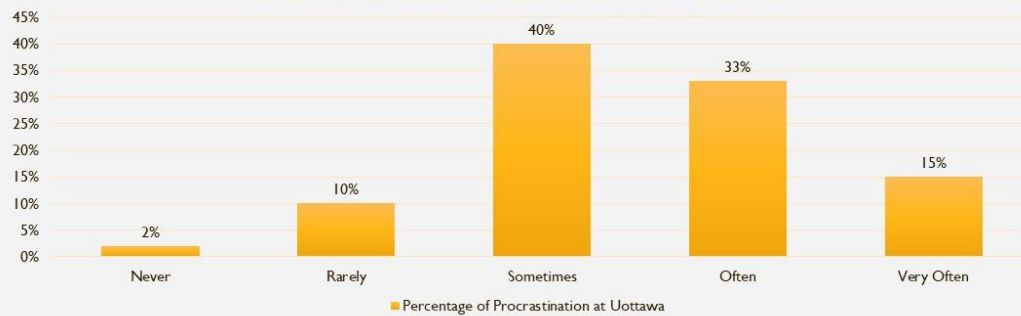
- Academic procrastination is restricted to the tasks and activities related to learning and studying (Steel & Klingsieck, 2016).
- It is defined as the act of voluntarily delaying the intended course of study-related behaviours (Steel, 2007).

WHAT PERCENTAGE OF STUDENTS PROCRASTINATE?

- A. 56%
- B. 68%
- C. 43%
- D. >70%

UOTTAWA PROCRASTINATION..

Percentage of Procrastination at Uottawa



WHAT ABOUT YOU?

WHAT ABOUT YOUR BEHAVIOURS – DO THEY FIT THOSE STATISTICS?

WHAT CONTRIBUTES TO PROCRASTINATION?

- Personality
- Situational characteristics
- Self-regulation
- Motivation, Goals, and Values

What about you?

VALUES AND GOALS

- What are three important academic goals you may have?
- What values play a role in those goals? (e.g. hard work, determination, knowledge)

GOALS AND VALUES VS. PROCRASTINATION BEHAVIOURS

- Let's discuss

"I'll do it at 5."

"I'll do it at 6."

"I'll do it at 7."

"I'll do it at 8."

"I'll do it at 9."



ACTIVITY: RULERS

- How important is it for you to change your procrastination behaviour?
- How confident do you feel in terms of terms of changing this behaviour?

RULERS ACTIVITY REFLECTION

- Did you feel that was helpful in showing you guys that there is hope in changing this behaviour?
- Did it make you realize that you all find the change important and you are fairly confident?

REVIEW OF THE DAY

- What is procrastination?
- Prevalence of procrastination
- How much we procrastinate
- Why we procrastinate
- Our goals and values
- Importance and confidence in changing

FOOD FOR THOUGHT

- Over the next week, I'd like you guys to try and be more conscious of your procrastination. When you procrastinate, I want you to think about why you are doing it.

**STOP
PROCRASTINATING
ON
PROCRASTINATION**



WORKSHOP 2

WHAT DID WE PROCRASTINATE ON THIS WEEK?

- Think about when you procrastinated...

Why do you think you procrastinated?
How did it make you feel?

What were some of the barriers present?

What are the benefits of procrastinating?
What the cons to changing?

What are the cons to staying the same? What are the benefits to changing?

THINK OF A TIME YOU DIDN'T PROCRASTINATE...

What is a barrier you overcame?

What strategy did you use?

What motivated you?

STRATEGIES USED IN THE PAST

- SMART GOALS

HOW CAN OTHERS HELP US?

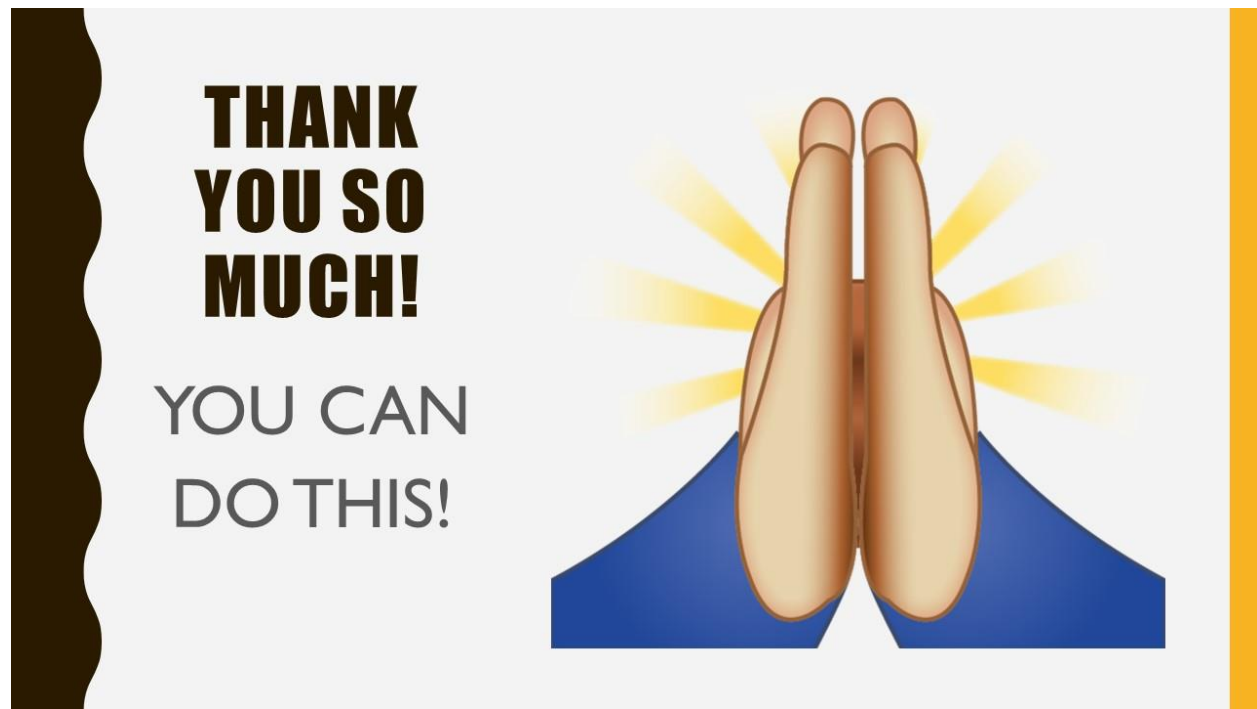
- Friends?
- University?

RULER ACTIVITY REVISITED

- How confident do you feel in making a change to your procrastination?

PUTTING IT ALL TOGETHER

- Now we are really going to put everything together and create a change plan together



Appendix G: Ethics Certificate Study 1

File Number: H09-16-02

Date (mm/dd/yyyy): 10/11/2017



Université d'Ottawa
Bureau d'éthique et d'intégrité de la recherche

University of Ottawa
Office of Research Ethics and Integrity

Ethics Approval Notice**Health Sciences and Science REB****Principal Investigator / Supervisor / Co-investigator(s) / Student(s)**

<u>First Name</u>	<u>Last Name</u>	<u>Affiliation</u>	<u>Role</u>
Maria	Rogers	Social Sciences / Psychology	Principal Investigator
Rylee	Oram	Social Sciences / Psychology	Research Assistant

File Number: H09-16-02**Type of Project:** Professor**Title:** University Experience of Undergraduate Students with ADHD

Renewal Date (mm/dd/yyyy)	Expiry Date (mm/dd/yyyy)	Approval Type
11/04/2017	11/03/2018	Renewal

Special Conditions / Comments:
N/A

Appendix H: Ethics Certificate Study 2

16/07/2019

Université d'Ottawa

Bureau d'éthique et d'intégrité de la recherche

University of Ottawa

Office of Research Ethics and Integrity

CERTIFICAT D'APPROBATION ÉTHIQUE | CERTIFICATE OF ETHICS APPROVAL**Numéro du dossier / Ethics File Number**

H-06-18-820

Titre du projet / Project TitleStop Procrastinating on
Procrastination! Using
Self-Determination Theory and
Motivational Interviewing to
Target Basic Psychological
Needs, Academic Motivation,
and Academic Procrastination**Type de projet / Project Type**Recherche de professeur /
Professor's research project**Statut du projet / Project Status**

Renouvelé / Renewed

Date d'approbation (jj/mm/aaaa) / Approval Date (dd/mm/yyyy)

16/07/2019

Date d'expiration (jj/mm/aaaa) / Expiry Date (dd/mm/yyyy)

25/07/2020

Équipe de recherche / Research Team**Chercheur / Researcher****Affiliation****Role**

Maria ROGERS

École de psychologie / School of Psychology

Chercheur Principal / Principal Investigator

Rylee ORAM

École de psychologie / School of Psychology

Étudiant-chercheur / Student-researcher

Conditions spéciales ou commentaires / Special conditions or comments