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EXPLORING UNDERGRADUATE STUDENTS' INFORMATION SEEKING MOTIVATION: A SELF-DETERMINATION PERSPECTIVE

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DEDICATION

To my family. I am eternally grateful for your love and support in everything I do.

ACKNOWLEDGEMENTS

To my committee, who stood by me through this long process, I extend my heartfelt thanks. Your guidance and unwavering support was a constant source of inspiration. I would also like to thank the professors who generously allowed me to collect data during class time. Thank you to the University of South Carolina SLIS family for taking me in and helping me find my way as a researcher. Finally, thank you to my fellow SLIS students and my colleagues at the University Libraries for your collegiality and companionship.

ABSTRACT

Human motivation is a widely debated construct in psychology and many disciplines in social science as well as education and health sciences have adopted various psychological theories in an effort to understand motivational forces behind many human activities from dieting (e.g., Schelling, Munsch and Margraf, 2011), psychotherapy (e.g., Martens, 2010) and academic achievement (e.g., Artino, Holmboe and Durning, 2012) to political participation (e.g., Hersh, 2012). Case (2012) devotes an entire chapter in his seminal text on information behavior to an overview of what he calls a "motivational puzzle" tying it to information need as the predominantly discussed dimension of motivation in information science literature.

Similarly to information science, where the subjectivist tradition researchers such as Dervin recognized goal achievement only partially accounts for information need as a motivational force in the information seeking process, recent psychological motivational theories moved toward differentiating between goals and increasingly focus on their behavioral and affective consequences (Deci and Ryan, 2000). By examining goal content and the regulatory processes through which goals are pursued, self-determination theory (SDT) used in the current study accounts for a spectrum of motivational force

Consistent with the subjectivist orientation in information science which aims to account for cognitive and affective forces behind information need, SDT recognizes the role of psychological development and well-being in goal attainment. Using structural equation modeling, the current study examines information seeking motivation in undergraduate students and its relationship with basic human needs satisfaction, as defined in SDT literature, as well as its effect on information seeking effort and enjoyment.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND:

Human motivation is a widely debated construct in psychology. Social sciences as well as education and health sciences have adopted numerous psychological theories in an effort to understand motivational forces behind many human activities from dieting (e.g., Schelling, Munsch and Margraf, 2011), psychotherapy (e.g., Martens, 2010), academic achievement (e.g., Artino, Holmboe and Durning, 2012) to political participation (e.g., Hersh, 2012). Given the ongoing struggle to define information, undeniably the most central concept in the information sciences, it is hardly surprising information seeking motivation has received relatively little attention. Case (2012) devotes a chapter in his seminal text on information behavior to an overview of what he terms a "motivational puzzle" tying it to information need as the predominantly discussed dimension of motivation in information science literature. Although they often disagree about the nature of those needs and the term itself (Savolainen, 2011), Robert Taylor, Nicholas Belkin, Carol Kuhlthau and Brenda Dervin are considered the most cited authors in information needs literature

Robert Taylor is widely known for his question negotiation framework focusing on communication between information seekers (i.e. library users) and information professionals (i.e. librarians, knowledge brokers). Through this framework, Taylor was the first to discuss the discrepancy between visceral and expressed information needs as a function of communication (Taylor, 1968).

Belkin (1980) adopted the visceral need concept including it in his information seeking framework he termed "anomalous state of knowledge" (ASK). According to Belkin, the primary motivator for research is the uncertainty or anomaly accompanying research. When information seekers perceive their knowledge to be deficient or incomplete they will initiate the process which will continue until the appropriate information is found or the seeker abandons search. Kuhlthau (1991) retains the concept of uncertainty as the primary motivator for research but also focuses on affect accompanying each stage of the research process. Finally, Dervin (1998) acknowledges humans are inherently curious and defines information need as a continuous search for meaning.

The evolution of concept of motivation in psychology mirrors that of information need in information sciences. Similarly to information sciences, where the subjectivist tradition researchers such as Dervin recognized goal achievement only partially accounts for information need as a motivational force in the information seeking process, recent psychological motivational theories moved toward differentiating between goals and increasingly focus on their behavioral and affective consequences

(Deci and Ryan, 2000). By examining goal content and the regulatory processes through which goals are pursued, self-determination theory (SDT), used in research design of the current study, accounts for a spectrum of motivational forces. Consistent with the subjectivist orientation in information sciences which aims to account for cognitive and affective forces behind information need, SDT recognizes the role of psychological development and well-being in goal attainment.

Information seeking motivation in information science has most frequently been discussed in connection with information need, uncertainty, gap and anomalous state of knowledge (Savolainen, 2011). Among those, information need emerges as the most enduring. Fidel (2006) indicates that the decades of conceptualizations of information need failed to significantly impact empirical research because of its focus on its situational aspects. She writes:

> "Whether an information need is defined as an incomplete cognitive state or as a trigger for a search, it delineates an individual situational state under local conditions. Using these approaches, information need researchers may be able to uncover the needs that the people they studied had at the time they studied them, but no information needs common to members of a community of actors. (Fidell p. 94)"

Indeed, most current research concerning information need focuses on task based information needs, where need is typically understood as a need for a specific kind of information from specific sources. It is hardly surprising the central question in human information behavior studies (i.e., why do people search for information?) remains unanswered beyond the situation level even though reviews of literature dating back to 1980's indicate researchers were aware of this gap in literature (Wilson, 1981). In order

to begin to address this question, research in information behavior needs to embrace the growing body of research in psychology on underlying psychological needs that motivate behavior.

Current research in psychology clearly demonstrates motivation is a complex, multidimensional construct where extrinsic (i.e., external) and intrinsic (i.e., internal) motivations exist on a continuum (Vallerand et al., 1992). Furthermore, these motivations are hierarchical and operate on a global (personality), contextual (domain) and situation (state) levels (Vallerand, 1997). However, current research on information seeking motivation has largely focused on studies at the situation level resulting in lack of studies at the global and domain levels.

Similarly, current research in information sciences largely disregards information seeking amotivation. Researchers acknowledge people actively avoid information to increase uncertainty or cope with information overload (e.g., Manheim, 2014). Additionally, researchers address human inclination to seek risk information (i.e., information that is perceived threatening because it challenges one's world view, or points to unpleasant outcomes) (e.g., Kahlor, 2010; Griffin, et al., 2004). However, amotivation is characterized by lack of action accompanied by feelings of incompetence and lack of control (Deci & Ryan, 1985) and its role in information seeking process remains unexplored.

Zipf's (1949) principle of least effort (PLE), indicating humans will invest the least amount of effort in order to obtain a desirable result, is arguably the most

influential theory addressing effort in information behavior research. However, PLE applies to all humans regardless of their motivational orientation and as such fails to differentiate between their internal and external motivational orientations. This is an important distinction since research in educational settings repeatedly demonstrates internally motivated students expend more effort and persist in an activity for longer periods of time than externally motivated students (e.g., Ryan & Connell, 1989; Connell & Wellborn, 1991). Focused on specific tasks, PLE also fails to account for information seeking effort at global and domain levels.

Additionally, most influential models of information seeking behavior ignore or only indirectly address effort as part of the information seeking process. Even when information seeking effort is implicit in the model, it functions at a situational level or else receives little to no empirical testing. For example, in his model of information seeking, Krikelas' (1983) addresses information source preference in connection with information seeking effort. Specifically, echoing PLE, he hypothesizes information seekers will prefer convenient (i.e., easy to contact or locate) as opposed to accurate sources of information. Consequently, links between intrinsic and extrinsic motivational orientations in terms of information seeking motivation and effort remain unexplored.

Similarly, although Nahl (2007) points out affective information use is conative and motivational while planning purposeful tasks, research on information seeking motivational orientations and enjoyment are largely absent in current information

behavior literature. Indeed, only few information seeking models consider emotions during information seeking process. Kuhlthau's (1993), information seeking process model provides, perhaps, the earliest and most detailed account of affective dimension of human information seeking from the initial stages to the presentation stage and beyond to assessment. However, her focus is on information seeking process initiated as a result of perceived gap in knowledge and as such is not intended to differentiate between students driven by curiosity and thirst for knowledge (i.e., internally motivated) and those focused on external rewards and punishments (i.e., externally motivated) students.

Hints of link between enjoyment and information seeking motivation appear in Parker and Berryman (2007) study on postgraduate student thoughts and feelings once they have found enough information on a task. Affective elements of their "understanding and engagement" category of enough, as described in the study, seem to mirror intrinsic information seeking motivation as defined by SDT. Passion for research and flow appear to be intrinsic drivers of information seeking motivation but the study concerns an assessed research task and is, therefore, conducted at a situational level.

Finally, previous research in psychology on research motivational orientations at the contextual level focuses on graduate students and faculty researchers (Deemer, Mahoney & Ball, 2012). It is widely accepted, intrinsic academic motivation in certain academic areas decreases with age (Gottfried, Fleming & Gottfried, 2001) and distinct

information seeking motivational scales and measurements are needed to accurately capture undergraduate students' motivational orientations.

1.2 RESEARCH PROBLEM

The purpose of the current study is threefold. First, in order to measure the extent to which undergraduate students are amotivated or extrinsically versus intrinsically motivated to seek information, the academic motivation scale (Vallerand, 1992) will be adapted and validated in information seeking context. Second, the study will examine how basic human needs, as defined by SDT, affect students' information seeking motivational orientation. Finally, the relationship between students' autonomous information seeking motivation and the amount of effort invested and enjoyment derived from the activity will be examined.

1.3 PURPOSE OF THE STUDY

The first goal of the current study is to examine undergraduate students' entire motivational spectrum from amotivation to intrinsic motivation as hypothesized by self-determination theory. The second goal is to confirm the hypothesized relationship between basic psychological need satisfaction and autonomous (i.e., self-determined) motivation. The third goal is to examine the effect autonomous motivation has on undergraduate students' information seeking effort and enjoyment while researching in their chosen field of study.

1.4 RESEARCH QUESTIONS

1. What is the nature of information seeking motivation of undergraduate students at the contextual level?
2. What is the relationship between relevant basic psychological needs as defined by SDT (i.e., perceived competence and autonomy support) and intrinsic motivation?
3. What is the relationship between autonomous motivation and effort invested in information seeking?
4. What is the relationship between autonomous motivation and enjoyment experienced during information seeking?

The first question aims to validate SDT theory in the context of information seeking at the domain (contextual) level. The second question examines the consequences of basic psychological need thwarting or fulfillment relevant to the context of the study. The third and fourth questions examine the consequences of internal motivational information seeking orientation.

1.5 SIGNIFICANCE OF THE STUDY

Understanding situational information seeking needs in students is important. Findings can inform systems' interface design and librarians' strategies to aid students in searching for a specific task. However, situational motivation is contingent on contextual or domain motivational orientation which is in turn contingent on global or personality motivational orientation (Vallerand, 1997). Therefore, understanding

information seeking motivational orientation at the domain level is necessary in order to fully appreciate students' more mercurial information need at the situational level.

Through application of SDT to information seeking motivation, subjectivist information seeking motivational perspective will be validated by providing empirical evidence for motivational antecedents beyond mere goal attainment. Understanding the interplay of students' basic need satisfaction (i.e., autonomy support, relatedness and competence) with their motivational orientation to seek information will also provide valuable insights that would pave way for further research. For instance, current research demonstrates students prefer to receive their information from their peers (Gross & Latham, 2009). If basic needs satisfaction relationship with information seeking motivation is understood, research could also address the role complex social interactions play in students' motivation to seek information from their peers.

SDT posits internally motivated individuals experience joy and exhibit more persistence while engaged in pursuit of intrinsic goals. In contrast, individuals who feel controlled experience pressure and stress and are far less likely to continue with their efforts (Deci and Ryan, 2000). Evidence supporting these hypotheses in information seeking context would enable librarians and teaching faculty to plan interventions promoting healthy life-long learning habits in students.

CHAPTER 2

LITERATURE REVIEW

2.1 INFORMATION NEEDS IN LIBRARY AND INFORMATION SCIENCE (LIS) LITERATURE

LIS Researchers widely acknowledge information seeking motivation is inextricably tied to information needs. Yet, most agree this relationship remains unexplored (Naumer and Fisher, 2010; Case 2012). The difficulty stems, in part, from researchers' inability to agree on a definition of the nature of information needs. In response to Ikoja-Odongo & Mostert's definition of information need as a "requirement that drives people into information seeking" (as cited in Case, 2012), Case observes the circular nature of this definition is symptomatic of a larger issue. Specifically, few researchers deeply question the nature of "information needs" relying instead on research conducted by Robert Taylor, Nicholas Belkin, Carol Kuhlthau and Brenda Dervin. Fidel (2012) echoes this conclusion pointing out the difficulty in defining information need, in part, stems from its origins in three distinct theoretical traditions Tuominen, Talja and Savolainen (2002) identify as: information transfer, the constructivist, and constructionist traditions.

Information transfer parallels Ellis' physical (i.e., system oriented) paradigm and is firmly rooted in the Shannon and Weaver's information theory. Information itself is seen as "an abstract, disembodied entity originally existing in the mind of the sender of

the message" (Tuominen, Talja and Savolainen 2002). The message is understood as an objective representation of reality that can be transferred to the receiver who is a passive recipient. The information as a concept would then reflect the positivist view of information as a "real entity that exists without human interaction with it" and information need as a "reality that exists in the actor's mind" (Fidel, 2012).

Constructivist view represents the shift toward the user center paradigm in LIS. Taylor, Kuhlthau, Dervin, and Belkin all point out users are not merely passive recipients of information because they actively engage in interpreting and assigning meaning to the message. Reflective of cognitive perspective, information is seen as an artifact of individual's thinking and memory processes that are reflected in the affect of that individual and influenced by society and culture. Taylor's model is one of the earliest examples of this tradition. His "visceral need" reflects the cognitive perspective by acknowledging meaning is constructed within user's mind and the resulting expressed "compromised need" represents the portion that can be understood by the receiver (i.e., librarian or a search engine). Currently, researchers recognize that, although Taylor's, Belkin's, Kuhlthau's and Dervin's conception of information need accounts for larger context outside the individual, it is not truly external in the sense that it disregards the conditions that motivate information seeking beyond information uncertainty (Naumer & Fisher, 2010).

Constructionism represents a reaction to constructivist focus on individuals. Language is considered a social construction that is used to communicate ideas and has little meaning beyond the social context. Motives are, then, "context dependent

discursive constructions" (Tuominen, Talja and Savolainen, 2002) existing only when expressed. Although, the debate continues, the notion of language as an almost entirely social construction as outlined in Vygotsky is currently considered outdated in linguistics. Chomsky's Universal Grammar where, in addition to input, language acquisition is contingent on innate, biological grammatical categories (Chomsky, 1965) is generally considered more current with plenty of evidence suggesting children need more than imitation to learn language (e.g., Yang, 2004). However, given the contextual nature of knowledge, constructionist argument that relevance and information need are also heavily dependent on context might be helpful as a framing device as it encourages investigation of information seeking within a specific discourse, theoretical framework or paradigm (Hjørland, 2002).

In addition to differing theoretical traditions, LIS researchers are also engaged in an ongoing debate about differentiation between information need, want and demand. In one of the earliest attempts to define information needs, Line (1974) describes information needs as that which one "ought to have" for research or recreational purposes, versus a want which he defines as what users would like to have. Demands are defined as "what an individual asks for", use as "what one actually uses, and requirement as a catchall category that can be used interchangeably. In his response to Line, Roberts (1975), suggest a single term (i.e., potential demand) should be used to encompass all terms prior to demand and considers them to be manifestations of demand. While these early attempts at defining information needs represent a significant step forward in defining basic terminology in a young field, by focusing on

demands, Line and Roberts disregard information needs users might not even be aware of. However, in his first major attempt to continue the debate, Wilson (1981) notes that the disagreement over definition of information needs is secondary to issue of appropriateness when the term is applied during the course of a specific investigation. Consequently, Wilson called for more user centered, task based studies in line with Line and Roberts' focus on user demands or information need satisfaction.

The task based approach has been instrumental in furthering understanding of various facets of information needs that can be used to improve users' interaction with information. For instance, a number of recent studies examine how students articulate information needs. Some of the more interesting findings in this area suggest students rarely reformulate queries and when they do, they tend to make a query more specific or more general, or iterate in different ways (Zhang, 2014); when faced with researcher imposed tasks, students with lower level of experience with web resources will use search strategies requiring less cognitive effort (Thatcher, 2008); complex topics tend to be broken down into several simpler and solvable research questions (Du & Evans, 2011).

User relevance studies (e.g., Yunjie & Zhiwei, 2006; Mu-hsuan & Hui-yu, 2004) point to topicality and novelty, as well as time, document presentation order and document numbers as essential components of relevance judgement among students. Studies about types of information preferred by users to satisfy their information needs suggest users base their decisions in part on volume and whether the information is

negative or positive (e.g., Stefl-Mabry, 2003); in everyday context, content of information, and availability and accessibility were more important to users than usability (e.g., Savolainen, 2008). However, as originally predicted by Wilson (1981), because task replaced information need, this perspective failed to address the information seeking motivation.

Perhaps the closest current LIS research comes to examining the why in connection with information seeking behavior is while investigating information avoidance. For instance, various studies in health context found people will avoid information if seeking it will cause them anxiety or dissonance (e.g., Johnson, 2014). Others found similar behaviors associated with impersonal risks such as environmental issues (e.g., Kahlor, et al., 2006) were also mediated by peer pressure.

Given the difficulties involved in determining just what motivates an individual to look for information by observing them during a specific task, Wilson (1981) suggested that the research in information science focus on information seeking toward satisfaction of needs. Recent research in psychology suggests that those same needs play a vital role in energizing behavior and motivating humans at specific task level and beyond (Ryan & Deci, 2008). Therefore, in order to begin to unpack students' information needs and understand why they seek information it is necessary to consider the nature of those needs.

2.2 NEEDS BASED MOTIVATION THEORIES IN PSYCHOLOGY LITERATURE

Human need research in psychology is arguably very much a work in progress. Therefore, no single theory is currently accepted as the dominant theory in the field. However, Basic Psychological Needs Theory (BPNT), one of the integral theories of the SDT metatheory, is unique in that it not only explains how needs translate into motivations but also how they relate to psychological wellbeing and wellness which in turn influence individuals' effort and enjoyment experienced during the activity. In order to explore roots of BPNT and underscore its importance in human information seeking motivation studies, the following section outlines the historical development of needs based motivation theories in psychology.

2.2.1 MURRAY'S PRINCIPLE NEEDS

Strongly influenced by Carl Jung, Henry Murray (1938) is one of the first psychologists to propose human needs were reflected in human behavior. Physiological needs (e.g., food, water, shelter) were classed as primary and psychological needs (e.g., independence, achievement, approval) as secondary needs. Combination of both primary and secondary needs were seen as present in an individual at varying levels. Full list of needs is presented in table 2.1. Murray believed the needs were hierarchical in nature (i.e., when primary and secondary needs conflicted primary needs would be satisfied first). Additionally, if two secondary needs were in conflict, the need with higher prepotency to the individual would be meet.

Table 2.1 *Murray's principle needs*

Need	Description
Abasement	To submit to censure
Achievement	To succeed at a challenging task
Affiliation	To connect with significant others
Aggression	To express hostility in the face of opposition
Autonomy	To act freely
Counteraction	To overcome defeat through action
Defendance	To act in a way that prevents ego to come to harm
Deference	To yield to those seen as superior
Exhibition	To draw attention to oneself
Harmavoidance	To avoid danger
Infoavoidance	To avoid situations causing humiliation
Nurturance	To aid the weak
Order	To achieve harmony through organization
Play	To engage in enjoyable activities
Rejection	To disregard those seen as inferior
Sentience	To revel in sensuousness
Sex	To engage in erotic relationships
Succorance	To seek help from sympathetic others
Understanding	To seek information in order to further knowledge acquisition

Based on Murray (1938)

Murray also believed need satisfaction was contingent on environment as much as on the individual developing a concept of press (i.e., environmental force that acts in concert with personality to develop behavior). As one of the first psychologists to attempt systematic categorization of needs and devise tests (e.g., Thematic Apperception Test) to empirically explore his proposed constructs, his work strongly influenced Abram Maslow and John William Atkinson among others.

2.2.2 MASLOW'S HIERARCHY OF NEEDS

In his Hierarchy of Needs, Maslow (1943) departs from Murray by imposing a more strict hierarchical order on human needs, today most frequently graphically represented in the shape of a pyramid. Seen in figure 2.1 placed at the bottom of the pyramid, as the widest and most basic of needs, physiological needs (e.g., food, water, oxygen etc.) represent necessities of life ensuring continued survival. According to Maslow, only after physiological needs are met, it is possible to move up the ladder toward the next, pre-potent (i.e., predominant) level of need. Consequently, once physiological needs are met, safety needs (e.g., shelter, consistency or routine in home life, freedom from threat etc.) operate as the dominant needs and other higher needs remain hidden. Maslow believed both physiological and safety needs were largely satisfied in contemporary American society where most people are free of hunger and enjoy a society that successfully promotes safety. Therefore, most well-adjusted individuals are dominated by safety needs only in emergency situations such as war, natural disasters or during crime waves leaving only neurotics at this stage of need.

Social needs (i.e., love, affection and belongingness) emerge as dominant after physiological and safety needs are met and giving love and affection is considered as important as receiving them. Maslow considered thwarting of social needs as the predominant cause of maladjustment and psychopathology. Esteem needs (i.e., need for self-respect or self-esteem) based on achievement, self-evaluation and respect from others are separated into need for freedom based on confidence stemming from evaluation of others, foreshadowing BPNT's autonomy support and need for recognition by others reminiscent of BPNT's competence. Finally, once all lower needs are met, self-actualization (i.e., desire for self-fulfillment) propels individuals to fulfil their potential according to their talents and aspirations.

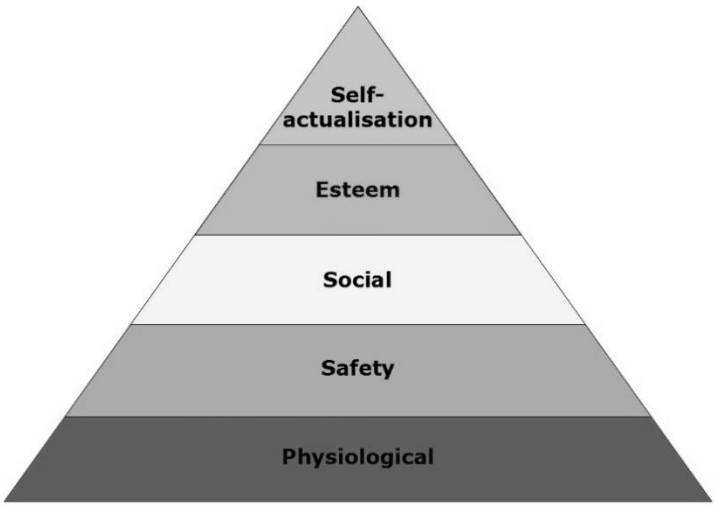

Figure 2.1 *Maslow's hierarchy of needs*

Maslow noted only few exceptions to the order in which needs are satisfied, most caused by unusual circumstances and difficulties encountered during development. However, even then those apparent shifts were considered exceptions confirming the rule. For instance, individuals who value self-esteem over affection he

described as “self-esteem seekers for the sake of love.” It should, however, be noted that Maslow acknowledged, most needs can never be completely satisfied and most individuals can and do proceed to the next level in the hierarchy even if the preceding need is only partially satisfied.

Although intuitively satisfying, Maslow’s Hierarchy of Needs was often criticized for its lack of empirical support and various scales developed to measure components of the Theory were called into question for their lack of validity and reliability (e.g., Wahba & Bridwell, 1976). Additionally, newer theories such as Alderfer’s Existence, Relatedness and Growth (ERG) Theory proved to be more successful in explaining individual’s progression toward self-actualization by distinguishing between need satisfaction at the maintenance (i.e., physiological and safety needs) and growth (i.e., social, esteem and self-actualization needs) levels.

2.2.3 ALDERFER’S ERG NEEDS THEORY

In an effort to address various deficiencies in Maslow’s Hierarchy of Needs, Clayton Alderfer (1969) introduced a number of modifications such as organization of needs into fewer, more flexible categories reflective of the individual and abandoned Maslow’s hierarchy allowing for all needs to be pursued simultaneously. Seen in table 2.2, Alderfer’s needs map to Maslow’s Hierarchy and in order of presentation include: existence (formerly physiological and safety) needs, relatedness (social and esteem) needs, and growth (self-actualization) needs. Although Alderfer maintains needs are met simultaneously and not necessarily in any particular order, his approach to need

satisfaction remains somewhat hierarchical. For instance, movement through needs is most optimal when progressing from existence to growth needs creating a sense of satisfaction in an individual. When the direction changes and the movement is, instead, directed downward (i.e., from growth to existence) individuals experience frustration.

Table 2.2 *Alderfer's ERG needs*

ERG Needs	**Maslow's Hierarchy of Needs**
Existence	Physiological
	Safety (material)
Relatedness	Safety (interpersonal)
	Social (love, belongingness)
	Esteem (interpersonal)
Growth	Esteem (self-determined)
	Self-actualization

Additionally, Alderfer (1972) later also suggested increases in satisfaction of lower needs such as existence will result in increases in the desire to satisfy higher order needs such as relatedness leading to an "enrichment cycle." However, decreases in the higher level needs satisfaction will lead to increases in the desire to satisfy lower needs (e.g., if the atmosphere at work is hostile individuals may attempt to compensate by pursuing higher pay). Finally, the less each level of need is satisfied the more it will be desired (e.g., in a hostile work environment an individual might attempt to stick to a daily routine to maximize safety).

Need satisfaction is also differentiated in terms of goals pursued and actions necessary for goal attainment. Specifically, existence needs are characterized by pursuit of physical objects (e.g., food, water and oxygen) that can be in limited or abundant supply. Therefore, they are instrumental in creating competition when resources are scarce. Relatedness needs, however, are satisfied through interaction with others (in groups or individually) and the process is characterized by mutuality (e.g., receiving affection is preceded and/or followed by giving affection). Therefore, a component of safety needs growing out of affection and the non-material is also included in the category. Esteem as a function of interaction with the environment is also included. Growth, in turn, proceeds in cycles as individuals strive to positively affect their environment and develop new abilities, in process, contributing to feeling of self-actualization. Since Alderfer maintains that the environment plays a greater role in esteem development, his growth category also includes portion of esteem resulting from positive self-evaluation.

Alderfer and Guzzo (1979) also differentiate needs according to their endurance. The more enduring needs tend to change slowly over time and are reflective of the way humans experience events stretching over longer periods of time (e.g., pursuing a degree or contributing in a workplace). Episodic needs, in turn, are affected by day to day events such as a taking a test or participating in a meeting at work. This is an important distinction given the scarcity of longitudinal studies conducted in connection with needs as it suggests most studies conducted up to that point dealt with episodic rather than more elusive enduring needs. While Alderfer makes no effort to connect the

enduring needs to episodic needs, his idea represents the first such hierarchy of needs which will be later developed by Vallerand (1997) to include intrinsic and extrinsic motivations as hierarchical constructs operating at the personality, domain and situational levels.

Overall, ERG theory received mixed support but it held up to empirical testing somewhat better than Maslow's Hierarchy of Needs. Using cluster and factor analysis, Wanous and Zwany (1977) established the three needs categories which they then used to test the relationship between need satisfaction and their importance. Additionally, to confirm the existence of the "satisfaction progression" and the "frustration regression" cycles, they also tested the upward and downward causal relationships. Unlike most studies testing the validity of Maslow's Hierarchy, results supported the validity of the ERG hierarchical structure in the organizational setting.

More recently, Arnolds & Boshoff (2000) examined the relationship between need satisfaction progression as defined by ERG and job performance. Their results contradicted earlier studies (e.g., Wilcove 1978; Alderfer & Guzzo 1979) finding that blue-collar workers' performance failed to improve when their growth needs (i.e., respect and personal development) were satisfied indicating there was a gap between behavioral intention and actual performance. In their follow up study (Arnolds & Boshoff, 2002), the mediating relationship of personality construct self-esteem between ERG needs and job performance among managers was examined. The results indicated self-esteem was significantly related to job performance and the growth need

satisfaction was significantly related to self-esteem while existence and relatedness needs had no relation to self-esteem. The authors suggested while their results provided limited support for Alderfer's ERG theory, they were more in line with Herzberger's Motivator-Hygiene Theory.

2.2.4 HERZBERGER'S MOTIVATOR-HYGIENE THEORY (MHT)

Like Alderfer, Herzberg was also influenced by Maslow's Hierarchy of Needs. However, unlike Alderfer and Maslow who believed satisfaction of all needs contributed to motivation, Herzberg's theory (Herzberg, 1968) separates needs into motivators and hygiene factors. The proposition stems from his early recognition while studying engineers that the lack of job dissatisfaction did not equal job satisfaction any more than lack of job satisfaction equaled lack of job dissatisfaction. Therefore, it made sense to develop two distinct continua for job satisfaction and dissatisfaction. Maslow's primary needs (i.e., existence and relatedness) were considered "hygiene" (i.e., contributing to job dissatisfaction) factors and growth factors were, in turn, considered motivators (i.e., contributing to job satisfaction). Specifically, achievement, recognition for achievement, the work itself, responsibility, and growth or advancement were considered motivators, while company policy and administration, supervision, interpersonal relationships, working conditions, salary, status, and security were considered hygiene factors.

While certainly a very distant cousin to BPNT, by organizing (and explicitly recognizing them as such) his two factors around intrinsic (i.e., motivator) and extrinsic

(i.e., hygiene) factors, Herzberg's Motivator Hygiene theory is one of the first to propose and test the link between satisfaction and intrinsic and extrinsic motivation. Namely, in the aforementioned study, he found motivators were capable of increasing job satisfaction while hygiene factors only decreased dissatisfaction and had no effect on job satisfaction. The theory, therefore, allows for employees to simultaneously experience job satisfaction and dissatisfaction. However, hygiene factors were considered distractors which needed to be addressed before motivators were introduced to improve employee performance.

The two proposed continua for satisfaction and dissatisfaction have since been empirically tested and disproved (Lindsay, Marks & Gorlow, 1967) when significant correlations between satisfaction and dissatisfaction factors were found, paving the way for future theories such as BPNT. An additional study (Gordon, Pryor & Harris, 1974) also found Herzberg's data gathering techniques prevented responders from voicing their dissatisfaction with motivators thereby calling into question his assertion that the absence of motivators caused no job dissatisfaction and that the hygiene factors caused no job satisfaction.

Additionally, unlike Maslow's Hierarchy on which it was based, HGT was not intended as a general theory. Even though it was tested in various cultures, Herzberg's theory was developed with the specific intent to aid managers in work performance improvement and is, therefore, not applicable to other contexts. Unlike BPNT it also

fails to take into account individual differences relying instead on broad divisions of workers into managers and blue-collar workers.

Herzberg was hardly the only psychologist to consider expectations in connection with motivation and, although out of scope in the current section of this document as it is based on beliefs rather than needs, it is important to note, Victor Vroom's Value Expectation Theory has largely replaced Motivation Hygiene theory in the current psychology literature.

2.2.5 MCCLELLAND'S ACHIEVEMENT MOTIVATION THEORY (AMT)

In his seminal work on achievement, McClelland's (1961) proposed yet another version of the need based motivation theory. He groups needs into three categories (i.e., Achievement Motivation, Authority/Power Motivation and Affiliation Motivation). While other need based theories consider needs to be universal (i.e., present to a certain degree in all humans), McClelland uses his need categories to group individuals according to what he considers their primary motivation to succeed. Descriptions of motivators are presented in table 2.3.

Table 2.3 *McClelland's AMT*

Motivation	**High**	**Low**
Need for Achievement (nAch)	Desires to excel at difficult tasks	Avoids responsibility for fear of failure
Need for Affiliation (nAff)	Desires to form bonds to others	Desires isolation
Need for Power (nPow)	Desires to dominate others	Defers to others

Based on McClelland (1961)

However, in contrast with previously discussed theories where needs were innate and their satisfaction or frustration dictated through various mechanisms (e.g., hierarchy), McClelland (1965) believed needs and the resulting motivations based on those needs could be learned and developed. Motives were defined as “affectively toned associative networks arranged in a hierarchy of strength or importance within a given individual”. He reasoned, even biological needs are learned as awareness of hunger or thirst requires a cue that must be processed in some way in order to be converted from a drive into a motive. Consequently, individual motivational orientations could change and could be subject to manipulation to help them better fit within an environment. For instance, individuals driven by need to achieve would find work in an organizational setting challenging because they might be perceived as domineering and those driven by need for affiliation might be seen as too weak due to their desire to be liked. In order to change motivational orientations McClelland proposes the following:

> (a) setting up the network—discovering what associations, for example, exist in the achievement area and then extending, strengthening, or otherwise "improving" the network they form; (b) conceptualizing the network — forming a clear and conscious construct that labels the network; (c) tying the network to as many cues as possible in everyday life, especially those preceding and following action, to insure that the network will be regularly rearoused once formed; and (d) working out the relation of the network to superordinate associative clusters, like the self-concept, so that these dominant schemata do not block the train of achievement thoughts— for example, through a chain of interfering associations (e.g., "I am not really the achieving type"). (McClelland, 1965)

McClelland's AMT has proved to be more empirically robust than either Maslow's Hierarchy or Alderfer's ERG and the existence of the three motives was empirically confirmed (Burdick, 1961). AMT received most wide acceptance in business settings as a way to improve performance by linking motivation types with performance measures (e.g., McClelland, 1998) and satisfaction (e.g., Harrell & Stahl, 1984). In his later studies examining the difference between the self-attributed motives (i.e., revealed through self-reports) and implicit motives (i.e., revealed through stories describing pictures) (McClelland, Koestner and Weinberger, 1989), McClelland agreed with Ryan and Deci that intrinsic motivation reflected in implicit motives was better at sustaining motivation over time because it was driven by enjoyment of the activity itself.

2.2.6 BASIC PSYCHOLOGICAL NEEDS THEORY (BPNT)

BPNT is one of the six mini theories comprising the Self-determination metatheory (SDT) used to explore students' information seeking motivation in the current study. Five of those are described in the remaining sections of this chapter. One of the major distinguishing characteristics of BPNT, separating it from previous motivation need theories, is the notion that only those human needs which when acting in concert with the environment contribute to growth and wellbeing can be considered basic needs. Consequently, physiological needs as descried by Murray and later by Maslow and Alderfer, are considered motives that energize action (Deci and Ryan, 2000) rather than true needs as the loose definition provided to describe needs produced endless lists rendering the concept meaningless. Furthermore, according to BPNT since

those needs are responsible for optimal psychological functioning they are innate rather than learned as was previously hypothesized by Murray.

The three BPNT needs are: relatedness (i.e.., need to feel connected with others in a meaningful way), competence (i.e., need to be considered skilled and successful when interacting with the environment) and autonomy (i.e., need to feel a sense of choice and freedom). Deci and Ryan's view of relatedness and competence is consistent with most psychology literature while autonomy also accounts for social nature of the individual. Specifically, autonomy needs to be supported by significant others (e.g., when a teenager chooses a college major the parents show support and respect for the choice). When satisfied, the three needs contribute to continued wellbeing, however, when thwarted they produce significant negative consequences. Since the needs are innate, individuals are often not consciously aware of their presence and can, indeed, engage in pursuit of other, often compensatory, actions (e.g., Murray's abasement). However, since those actions usually fail to produce the lasting sense of wellbeing at best, and harm the individual at worst, they are not considered basic psychological needs.

This view of basic psychologic needs stems from SDT's organismic dialectic orientation. Namely, Deci and Ryan (2000) maintain humans are naturally inquisitive, growth oriented organisms that use their capacity to adapt to the environment in such a way as to promote connections with others in an environment that is supportive of the three basic needs (i.e., competence, autonomy and relatedness). Deci and Ryan

acknowledge the existence of drives and physiological needs but, unlike most other motivation theorists to date, they consider them subordinate to basic psychological needs, maintaining physiological needs are regulated by psychological needs. Since most drive theories aim to explain how individuals deal with disturbances in their equilibrium, they argue, the goal is to return to that same equilibrium. However, according to SDT, humans are growth oriented organisms, and only the basic psychological need satisfaction or thwarting would account for their motivations.

Deci and Ryan (2000) acknowledge since basic psychological needs are innate, need satisfaction is not often pursued as a goal in itself (e.g., we read for pleasure of reading rather than to satisfy our need for autonomy). According to SDT, direct need satisfaction pursuit is often a result of prolonged thwarting of that need (e.g., individuals feeling controlled will seek to free themselves). However, individuals might instead pursue compensatory activities which will satisfy the need in short term. For example, need for competence might be temporarily masked by attainment of material wealth or status. Worse still, since the relief from original need thwarting in this way is temporary, individuals might lock themselves in perpetual struggle to attain wealth and be left with little energy to engage in activities satisfying the need for competence which would promote true psychological wellbeing in turn also affecting their physical health.

2.2.7 COGNITIVE EVALUATION THEORY (CET)

In addition to the differing views of basic needs as learned and varying in strength (e.g., McClelland, 1965) to innate basic needs, Deci and Ryan also point out that since those needs must be satisfied in order for an individual to function optimally, research concerning their strength in an individual is of little consequence and the focus shifts, instead, in favor of research exploring motivational orientations and goal contents, reflecting need satisfaction (or thwarting). Indeed, empirical research on basic psychological needs is mostly based on research on intrinsic motivation as a growth function and internalization as an "essential aspect of psychological integrity and social cohesion" (Ryan, Connell, & Deci, 1985 as cited in Deci & Ryan, 2000). As a part of SDT metatheory, CET was especially formulated to address the effects of basic need satisfaction and thwarting and the interaction with the social environment on development and maintenance of intrinsic motivation.

The evolution of intrinsic motivation definition is well documented in literature (e.g., Deci & Ryan, 1985). In the realm of SDT, researchers generally see it as a drive to engage in activities for their own sake. Intrinsic motivation consists of three distinct types and is, therefore, multidimensional. However, unlike extrinsic motivation the three types are not continuous (i.e. individuals are either intrinsically motivated or not) and, depending on the activity, individuals can simultaneously exhibit one or more intrinsic motivations. Empirical research shows, the three types of intrinsic motivation generally exhibit a simplex pattern and are more closely intercorrelated than they would

be with amotivation or the extrinsic motivation types (e.g., Pelletier et al., 1995; Vallerand et al., 1993; Mullan, Markland & Ingledew, 1997).

Intrinsic motivation toward accomplishment is centered on activity that promotes satisfaction and contentment as individuals strive toward accomplishment (Deci and Ryan, 2000). Student information seekers might, for instance, experience contentment when they research to discover increasingly relevant information on their assignments. Consistent with all types of intrinsic motivation, the feeling of contentment will, however, center on the activity itself rather than the end goal of a more thoroughly researched assignment. Intrinsic motivation to experience stimulation, in turn, is tied to sensory and aesthetic pleasures derived from the activity. For instance, students might select more visually appealing databases or printed materials to experience pleasure while researching. Finally, intrinsic motivation to know refers to activities individuals engage in in order to experience and learn something new. For instance, students might consistently seek out new sources of information while researching for assignments.

SDT proposes individuals can simultaneously sustain many different intrinsic and extrinsic motivational orientations. Further research also confirms, it is possible for intrinsic motivation to morph into extrinsic (i.e., externally driven) motivation and vice versa (e.g., Deci, Koestner, Ryan, 1999). For instance, when rewards are offered for activities originally engaged in for internal reasons, participants' motivational orientation becomes driven by the reward. Research shows, task contingent rewards

consistently induced decrease in intrinsic motivation (Ryan, Mims & Koestner, 1983) but the reduction depended on context (e.g., if the feedback was perceived as controlling versus informational).

2.2.8 ORGANISMIC INTEGRATION THEORY (OIT)

OIT addresses the extrinsic motivational orientation in its various incarnations and its antecedents and consequences. External motivation is, generally, differentiated from intrinsic motivation by locus of rewards sought (Vallerand, 2012). For extrinsically motivated individuals, locus of reward is external to the process which is seen as a means to an end. In contrast, intrinsically motivated individuals find the process itself enjoyable and are not as focused on a specific goal. It, then, follows that the emotions accompanying these motivational orientations would differ and the intrinsically motivated individuals would feel pleasure while extrinsically motivated individuals would feel pressured and stressed during the activity.

Although it was initially thought of as a unidimensional construct, according to SDT, extrinsic motivation consists of four distinct types of motivation existing on a continuum (Deci and Ryan, 2000). The validity and reliability of external motivation scales in various contexts has since been confirmed in a variety of settings such as sports (e.g., Vallerand & Losier, 1999) and therapy (e.g., Pelletier, Tuson & Haddad, 1997). External regulation is on the farthest end of the spectrum of controlled motivation and the behavior is entirely ruled by externalities such as rewards and punishment. For instance, a student might conduct research because they fear censure or are excited

about a possibility of a higher grade. Introjected regulation is slightly more internalized, but it is not autonomous and is ruled by past contingencies. For instance, a student might research because they want to avoid feelings of guilt and shame they felt in the past when they submitted a substandard paper as a result on insufficient research. Identified regulation is autonomous and the behavior is self-determined (i.e. done by choice) but the activity is still seen as a means to an end. For instance, a student might research outside the assigned material because they expect their argument in the assignment will be stronger if supported by more relevant information. Finally, integrated regulation is closest to the intrinsic motivation and is fully self-determined because the activity is not only done out of choice but it is also integrated into self along with other activities. For instance, in addition to searching for more information to strengthen their argument, students might also allow more time for research by planning ahead to eliminate possible conflicts with other activities or choose to conduct research at certain times of day when they feel most refreshed.

2.2.9 CAUSALITY ORIENTATION THEORY (COT)

COT is another mini-theory within SDT addressing the individual differences in causality orientations of individuals while engaged in activities and the value they place on those activities. Autonomously oriented individuals pursue activities out of interest and are intrinsically motivated. Controlled oriented individuals, in contrast, are focused on rewards and punishment resulting from the activity and are extrinsically motivated. Finally, amotivated individuals are impersonally oriented and display lack of sense of

control over their environment. The General Causality Orientations Scale is used to measure individual orientations and has been tested for reliability and validity (Deci & Ryan, 1985). Figure 2.2 illustrates the relationship between motivations types and individual causality orientations.

Research shows, autonomously oriented individuals consistently engage in prosocial behavior (Gagné, 2003), persist in activities (Ratelle, Guay, Vallerand, Larose & Senécal, 2007), have higher self-esteem (Deci, Nezlek, & Sheinman, 1981), tend to be less self-serving (Knee & M. Zuckerman, 1996) and self-handicapping (Knee & Zuckerman, 1998).

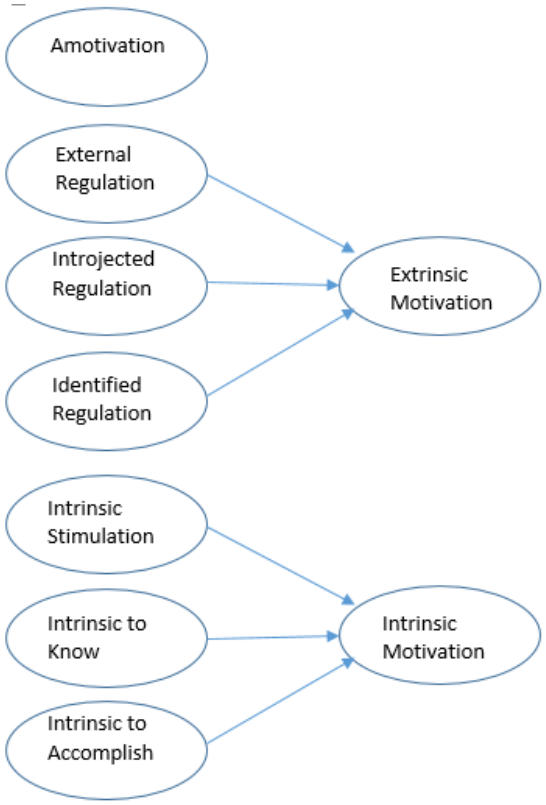

Figure 2.2 *Motivation and personal orientation*

Control oriented individuals were more likely to suffer low self-esteem especially when comparing themselves to those they perceived as better performers (Neighbors & Knee, 2003), engage in self-presentation (i.e., impression management) and suffer from lower self-esteem (Lewis & Neighbors, 2005).

2.2.10 GOAL CONTENTS THEORY (GCT)

Like motivations, goal content can also be viewed as intrinsic and extrinsic. Research shows goal contents are just as crucial in securing psychological wellbeing as strategies to pursue them (i.e., what is desired is as important as how it is attained) (Sheldon, Ryan, Deci, & Kasser, 2004). For instance, when goals are intrinsically formulated (e.g., teachers assign papers emphasizing learning objectives over grading procedures) individuals tend to respond by being more engaged, put in more effort and engage in more conceptual learning (Vansteenkiste, Lens & Deci, 2006). Although goal framing can be effective in enhancing wellbeing during a task performance, research also shows that the effect seems to be mediated by self-determined motivation. For instance, in their research on adolescents' weight perceptions and exercise goals, Gillison, Standage & Skevington (2006) found while intrinsic goals positively predicted self-determined motivation, which in turn positively predicted quality of life and exercise behavior, intrinsic motivation partially mediated the effects of exercise goals on exercise behavior and quality of life.

2.3 SUMMARY

Current LIS literature is in need of empirical studies capable of addressing the why of information seeking. While situation based studies answered important questions aimed at much needed improvements in negotiating reference transactions as well as systems' enhancements, deeper understanding of information seeking motivation is impossible without a deeper understanding of information seeking needs.

Recent research in motivational psychology shows distinct promise in addressing this research gap. By linking basic human needs to motivation, SDT metatheory can address both information needs and their influence on information seeking motivation and offer valuable insights currently lacking in LIS literature. In contrast with earlier theories, SDT has grown out of applied research and has been extensively tested in various contexts from sports (e.g., Briere, Vallerand, Blais & Pelletier, 2013), physical and mental health (e.g., Moran, Russinova, Yim & Sprague, 2014; Hartmann, Dohle & Siegrist, 2015; Bernard, Martin & Kulik, 2014) to organizational management (e.g., Robson, Schlegelmilch & Bojkowszky, 2012; Oostlander, Guntert, van Schie & Wehner, 2014). The theory has also been validated across cultures (Deci, Ryan, Gagné, Leone, Usunov & Kornazheva, 2001; Chirkov, Ryan, Kim & Kaplan, 2003) with no significant differences found in basic needs and their influence on motivational orientations between collectivist and individualist societies.

Additionally, current LIS literature lacks research focusing on information seeking motivations beyond situational level. In addition to being multidimensional constructs,

intrinsic and extrinsic motivation, as understood in SDT, operate at different levels of generality (i.e., global, contextual and situational). The three levels of generality are also hierarchical in nature (Vallerand, 1997). Since global motivational orientation is a reflection of success of process of integrating activities into the self, this personality dimension will affect how individuals integrate motivations at the contextual and situational levels. Similarly, contextual level will affect the situational level of generality reflective of current activities.

The global level refers to personality (i.e., individuals' general tendencies to interact with the environment in autonomous or controlled way). According to Deci and Ryan (2000) humans have an innate need to engage in stimulating activities and through this engagement constantly redefine themselves. If one's basic psychological needs are met, the autonomous, intrinsically motivated activities will be a reflection of their nascent selves, and even some of the extrinsically motivated acts will be gradually integrated into the self. If these needs are thwarted individuals will behave in controlled ways, which in addition to being less likely to be integrated into the self will also contribute to engagement in compensatory activities which will in turn, make meeting those needs even less likely.

The contextual level of generality refers to domains of activity which change over time but are much more stable in terms of response to environmental stimuli than those at the situation level. The current study, for instance, examines motivational forces of students engaged in college level research in students' major. By examining

basic psychological needs in connection to intrinsic and extrinsic motivation at contextual level, the study accounts for the academic environment, interactions with significant others (e.g., parents, teachers and other students) and the culture within which these interactions occur.

In contrast, studies at the situational level focus on tasks and are strongly influenced by in- the-moment feedback and consequences of actions. For instance, research conducted for a specific research assignment would be influenced by the instructions as well as professor's feedback. Current LIS research draws useful inferences from situational level studies sometimes conducted over decades as demonstrated by numerous information behavior models used for system's development (e.g., Belkin's ASK is used for query refinement in search engines). However, because of their lack of focus on higher level, contextual elements influencing research behavior at domain level, these studies have been unsuccessful in solving the motivational puzzle at that level. Current study aims to fill this gap in research using measurement scales based on SDT to measure motivation at the domain level.

CHAPTER 3

METHODOLOGY

The purpose of the current study is to empirically examine information seeking motivation in undergraduate students at the contextual level (i.e., while researching in their major area of study). Additionally, in line with SDT, the role basic psychological needs play in furthering intrinsic information seeking motivation in undergraduates is examined. Finally, correlation between intrinsic information seeking motivation and enjoyment and effort invested are explored. The following chapter is organized into three sections describing data collection, measurement instruments, and analytical procedures.

3.1 DATA COLLECTION

Since the aim of the study is to examine academic information seeking motivation, all undergraduate students engaged in research in their major field of study, regardless of age and sex, were included in the study. To ensure a wide distribution of majors, undergraduate students at a large metropolitan university enrolled in courses required of all undergraduate students were surveyed. Survey instrument was distributed electronically to the selected sample through Qualtrics data collection service during the regularly scheduled class time to ensure maximum response rate. Students' consent was obtained through an online form preceding the survey. In accordance with the IRB requirements, the text of the informed consent form clearly

indicated participation was voluntary and there will be no negative consequences for choosing not to participate. Instructors offered no incentives for participation.

There is no clear consensus in literature about the exact sample size required for confirmatory factor analysis or other structural equation modeling procedures with estimates running from one hundred to five thousand subjects (Schumacker & Lomax, 2012). For normally distributed data relying on maximum likelihood estimator, it is generally accepted that sample size of at least 200 is sufficient (Gorsuch, 1983). However, in order to minimize the effects of sampling error, prior to conducting confirmatory factor analysis two random samples of over 200 participants were collected. Demographic questions pertinent to motivation in context of self-determination theory (see appendix A) were also included in the study.

3.2 MEASUREMENT INSTRUMENTS

Academic Motivation Scale – College Version (AMS-C-28) (Vallerand et al., 1992), was adapted to create Information Seeking Motivation Scale (ISMS) presented in Table 3.1. AMS subscales were confirmed to have high level of internal consistency with Chronbach alpha levels above 0.8 for all subscales except for identified regulation with levels above 0.6 (Vallerand et al., 1992). Like AMS, ISMS measures motivation at the contextual level in the same life domain (i.e., education) and includes 28 items representing 7 motivational subscales posited by SDT from amotivation to intrinsic motivation (Table 3.1). Integrated regulation is not included and has not been confirmed in education domain to date. Responses are recorded on a 7 point Likert scale from strongly agree to strongly disagree. Stem question "Why do you search for

information in your major?" precedes all answer choices. Like AMS, ISMS is scored by summing and computing averages for each subscale where lower scores indicate higher levels of self-determined motivation.

Table 3.1 *Information seeking motivation scale (undergraduate student version)*

Motivational Orientation	Information Seeking Motivation Subscale	Items
Amotivation	Amotivation	I don't really know and I haven't thought about it before
		I am not sure why and I don't care
		I am overwhelmed and don't think I am getting much from researching
		I used to know but now I can't seem to accomplish my research goals
Controlled motivation	External regulation	Because I need to get good grades
		Because I need to do well on written assignments
		Because I need to keep my GPA as high as possible
		Because I need to do well on exams
	Introjected regulation	Because being well informed in my major makes me feel good about myself as a student

		Because being well informed in my major of study gives me confidence in myself as a student
		Because being well informed in my area of study makes me feel more competent as a student
	Identified regulation	Because being well informed in my area of study makes me feel smart
		Because it will help me be knowledgeable about my major
		Because it will help me master knowledge I need to be successful in my major
		Because it will help me be more proficient in my major
Self-determined motivation	To know	Because it will help me have a better understanding of important ideas in my major
		Because it makes me happy to learn something new about my major
		Because I love discovering information I never knew existed

	Toward accomplishments	Because it gives me pleasure to explore information in my major
		Because it makes me happy to deepen my understanding of my major
		For the satisfaction I feel when I find important information in my major area
	To experience stimulation	Because I enjoy mastering information related to my chosen major
		Because I like mastering research in my major
		For the satisfaction I feel when I improve my knowledge of research in my major
		Because it's exciting to research in my major
		Because looking for information in my major is fun
		Because researching in my major is stimulating
		Because I enjoy immersing myself in research in my major

To measure basic psychological needs, 2 scales were adapted for use measuring perceived autonomy support and perceived competence. Relatedness has not been confirmed in solitary activities such as information seeking and was not included in the present study. Learning Climate Questionnaire (LCQ) short form (Williams and Deci, 1996) was adapted to construct Perceived Information Seeking Autonomy Support Scale (PISASS) (Table 3.2). LCQ short form consists of 6 items and boasts a high level of internal consistency with Cronbach Alpha levels typically over 0.9 (Black and Deci, 2000). LCQ has been tested across cultures and contexts and translated into numerous languages (e.g., Granero-Gallegos et al, 2014, Hetland et al., 2011 and Ntalianis, 2010). Since the current study focuses on contextual motivational level, the answer choices focusing on a specific instructor during a specific task were changed to "Most professors in my major are…" to include all instructors in a students' major area of study. Consistent with the ISMS, answer choices range from "strongly agree" to "strongly disagree" on a 7 point Likert scale. PISASS is scored by averaging students' responses on the 6 items.

To measure perceived information seeking competence, perceived information seeking competence scale (PISCS) was constructed. Self-efficacy for information seeking scale (SISS) (Van der Vord, 2010) and Perceived Competence for Learning Scale (PCLS) (Williams and Deci, 1996) were adapted for this purpose. Both scales measure competence at contextual level and exhibit high level of internal consistency with SISS Chronbach alpha levels at 0.91 and PCLS levels above 0.8. PISCS responses are recorded on a 7 point Likert scale ranging from strongly agree to strongly disagree. Similarly to

PCLS, PISCS is scored by averaging students' responses on the 4 items where lower scores indicate higher levels of perceived competence.

Table 3.2 *Basic information seeking psychological needs*

Basic Psychological Information Seeking Need	Items
Perceived Autonomy Support	Provide me with choices and options about research resources in my major
	Are confident in my ability to choose my own research resources in my major
	Encourage me to seek information on my assignments
	Make sure I understand why I need to do my own research
	Provide me with positive feedback when I seek information in my major
	Encourage me to ask questions about research in my major area
Perceived Competence	It's easy to find information on assignments and exams in my major
	I'm confident I can find information on assignments and exams in my major
	When researching in my major I am capable of avoiding inaccurate information
	When researching in my major I am capable of avoiding misleading information

Information seeking effort scale (ISES) was adapted from 2 item Effort Scale (ES) and 4 item Persistence Scale (PS) (Elliot, McGregor and Gable, 1999). Both ES and PS internal consistency levels are high with ES at 0.93 and PS at 0.78 on Chronbach alpha scale. Information seeking enjoyment scale (ISENS) was constructed for the present study. Similarly to other scales in the current study, ISES and ISENS (Table 3.3) responses are recorded on a 7 point Likert scale and follow the same scoring scheme.

Table 3.3 *Information seeking effort and enjoyment scales*

Scale	Items
Information Seeking Effort	I put a lot of effort into researching in my major
	I work hard to find information I need in my major
	When I don't find enough information for assignments in my major I go back and do more research
	Even if researching in my major is difficult I invest lots of time and effort into research
Information Seeking Enjoyment	I enjoy researching in my major
	I find pleasure in researching in my major
	Researching in my major is one of my favorite parts of the process when preparing for exams and writing papers

	Researching in my major usually makes me happy

3.3 ANALYTICAL PROCEDURES

Data will be analyzed using the Statistical Package for Social Sciences (SPSS) version 19.0 and Linear Structural Relations software (LISREL) version 9.2. SPSS will be used to conduct data screening prior to analysis as well as to create composite variables and conduct internal consistency reliability analysis. Data screening involves checking for univariate and multivariate normality. Univariate normality refers to a single variable, while multivariate normality refers to data distribution for multiple variables. Normally, distributed data follow bell curve distribution with most data points within 2 standard deviations from the mean (Lockhart, 1998). Kurtosis (i.e., data distribution around the mean) and skewness (i.e., deviation from distribution symmetry) levels in a perfectly normally distributed data should be close to 0.

Multivariate normality is especially crucial in structural equation modeling and analysis of data violating this assumption can result in unreliable standard errors and coefficients. Skewness in particular can cause lower estimates for factor correlations and loadings, as well as lower error variance and standard error estimates (Byrne, 1998). To address these issues, prior to analysis non normal data are either transformed or an estimator appropriate for the specific violation of normality is used (e.g., Generalized

Least Squares, Weighted Least Squares etc.) instead of the Maximum Likelihood estimator commonly used in analysis of normally distributed data.

Internal consistency reliability for all scales in the current study was assessed using Cronbach Alpha measure for each construct. Cronbach Alpha measures how well a set of measured (i.e., observed) variables measures a single latent construct. Levels range between 0 and 1. Generally, highly correlated indicator variables as well as a higher number of indicator variables tend to produce higher Cronbach Alpha levels and levels too close to 1 are not always desirable. In social sciences, levels above 0.7 are considered acceptable (Nunally and Bernstein, 1994).

After the tests of reliability are conducted, confirmatory factor analysis (CFA) was conducted to establish the factorial validity of ISMS college version. CFA was developed to measure how well as set of items represents a latent construct. The method was chosen over the exploratory factor analysis (EFA) because the hypothesized relationships can be specified a priori in accordance with SDT, while EFA seeks to find a model that best fits the data. To reduce sampling error, the sample was split into 2 random samples and CFA analysis conducted on both samples.

In addition to exhibiting acceptable levels across all global fit indices, a well-fitting model should contain feasible parameter estimates (e.g., correlations <1, positive definite correlation matrices, no negative variances etc.) and standard errors (i.e., not extremely large or small) (Byrne, 1998). Additionally, measurement model should indicate the observed variables adequately represent their latent construct as

determined by the squared multiple correlations (R^2) levels ranging from 0 to 1. For instance, SMC of 0.3 would indicate 30% of variance on that latent construct is accounted for by the indicator variables.

Currently, there is no consensus on which specific global fit indices indicate satisfactory CFA fit. Most researchers recommend relying on indices with different measurement properties including measures of absolute fit, incremental fit and parsimony based fit indices. Measures of absolute indicate how well the model fits data without relying on comparison to other models (Jöreskog and Sörbom, 1993). As a measure of absolute fit, Chi square value with the corresponding degrees of freedom indicates the overall model fit. Contrary to most statistical analyses, CFA requires a nonsignificant Chi square value as this indicates there is little difference between the sample variance/covariance matrix and the theory implied reproduced covariance matrix. However, for large samples (i.e., over 200) Chi square statistic is nearly always significant in CFA analyses. This is generally considered acceptable provided the other indices are satisfactory.

Other frequently reported absolute fit indices (i.e., based on the implied covariance matrix) include Goodness of Fit Index (GFI), Expected Cross-validation Index (ECVI), the Standardized Root Mean Square Residual (SRMR) and Root Mean Error of Approximation (RMSEA). GFI measures the amount of covariance explained by the implied covariance matrix. GFI levels range between 0 and 1 although studies with just identified and overidentified models with low Chi square values have reported GFI levels

larger than 1 (Kline, 2011). Acceptable levels need to be over 0.9 (Byrne, 1998) although some researchers consider this too low recommending levels of at least 0.95 and above. ECVI measures the difference between the sample covariance matrix and the expected covariance matrix of the equivalent sized sample (Browne and Cudeck, 1998). Satisfactory ECVI levels should be somewhere between the ECVI value for the saturated model (i.e., model where all parameters are estimated) and the ECVI value for the independence model (i.e., where all variables are independent). SRMR is used to measure the difference between the sample correlation matrix and the expected correlation matrix. Values range from 0 to 1 with the acceptable levels below 0.8 (Browne and Cudeck, 1993). Finally, RMSEA shows how well a perfect model, (i.e., with unknown but optimally chosen parameter estimates) would fit the populations covariance matrix (Byrne, 1998). Historically, RMSEA values below 0.8 were considered acceptable (MacCallum et al., 1996) but more recent studies recommend values lower than 0.5 (Hu and Bentler, 1999) for well-fitting models.

Incremental fit indices are based on comparison between the independence model (i.e., zero correlations among variables) and the hypothesized model. Frequently reported incremental fit indices include: Normed Fit Index (NFI), Non-normed Fit Index (NNFI), Comparative Fit Index (CFI) and the Incremental Fit Index (IFI). Values for this class of indices range between 0 and 1 with recommended acceptable fit values generally expected to be at 0.95 or higher (Kline, 2011). Both NFI and CFI compare the hypothesized model with the null model but the CFI takes into account sample size and has shown to perform better in models using smaller sample sizes (Bentler, 1990). NNFI

was originally intended to rectify NFI issues with small size samples also taking into account model complexity. However, since it is non-normed, it can be difficult to interpret in relation to other indices. Consequently, CFI is currently considered the most accurate of the available incremental fit indices (Bentler, 1990).

Finally, parsimony fit indices examine the overall model fit in relation to its complexity. Generally, more complex nearly saturated models tend to exhibit better overall fit. Parsimony fit indices introduce penalties for model complexity and result in lower fit values as the model complexity increases. Frequently reported values include: the Parsimony Goodness-of-Fit Index (PGFI) and the Parsimonious Normed Fit Index (PNFI). PGFI is based on GFI and PNFI is based on NFI adjusted for loss of degrees of freedom. However, while these indices can be instructive, recommended values vary widely with no consensus in literature as to levels indicating acceptable fit (Mulaik, et al., 1989).

Finally, the full structural model, presented in Figure 3, tested the hypothesized relationships between the basic psychological needs (i.e., perceived competence and perceived autonomy support), intrinsic motivation and information seeking effort and enjoyment. According to SDT (see Figure 3.1), basic psychological need satisfaction should positively influence intrinsic motivation which will in turn positively affect information seeking effort and enjoyment. While CFA includes a measurement model, structural equation model (SEM) involves only paths between latent constructs. To

ensure validity of latent constructs, multidimensional scales were subjected to CFA prior to their inclusion into the full SEM.

SEM in current study is composed of 3 dependent and 2 independent variables. In addition to global fit indices used in CFA reporting, SEM also requires inspection of structural paths. In LISREL, regression coefficients linking independent and dependent latent constructs are listed in the gamma matrix, while those linking dependent latent constructs reside in the beta matrix. Additionally, disturbance terms (Zetas) associated with each construct need to be examined to determine model fit.

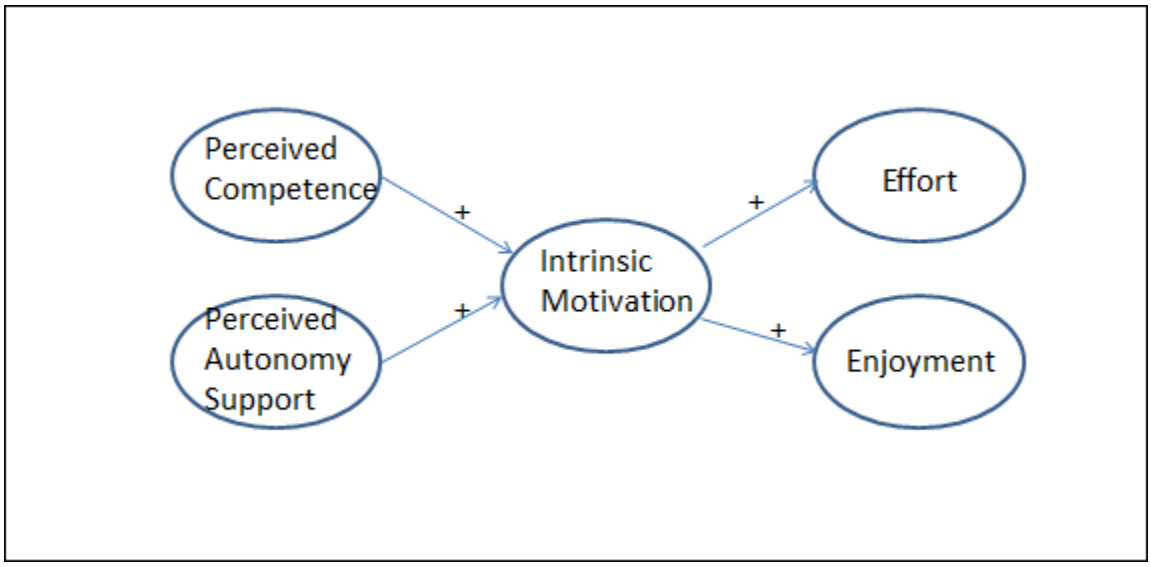

Figure 3.1 *Hypothesized full model*

In summary, procedures detailed in this chapter will lead to the development and validation of a new tool, LIS researchers and educators can use to measure and score undergraduates' information seeking motivation at the contextual level. Additionally, five scales measuring information seeking effort, information seeking enjoyment, and the two basic psychological needs associated with research (i.e..,

perceived competence and perceived autonomy support) will be adapted and validated in the information seeking context at the undergraduate level. Finally, the relationship between basic psychological needs and autonomous motivation and effort and enjoyment will be modeled to confirm the hypothesized relationships.

CHAPTER 4

RESULTS

4.1 PARTICIPANTS

As seen in table 4.1, slightly over half of participants were male. Close to 60% were freshmen. Since this number is high, analysis using only freshmen sample and all other students as a separate sample to construct the ISMS scale was performed and showed there was no significant difference between the two samples. Most students reported high GPAs with over half of the population reporting GPAs over 3.5. Somewhat heavier concentration of business students is reflected in the University of South Carolina enrollment numbers with business students representing one of the most numerous groups second only to College of Arts and Sciences student numbers. While normality of data is assessed looking at kurtosis and skewness, there is little consensus as to how far those values can be from zero before the data are considered non normal. However, Curran (1996) conducted a Monte Carlo simulation study, establishing that the skewness scores between 2 and 3 and kurtosis scores between 7 and 21 point to moderately non normal data while skewness values above 3 and kurtosis levels above 21 point to extremely skewed data. As seen in Table 4.1, all demographic variables in the current study exhibited univariate normality with skewness and kurtosis values within acceptable ranges.

Table 4.1 *Sample descriptive statistics (N=588)*

Variable		N	Percentage	Mean	SD	Skewness	Kurtosis
Gender		588	100%	1.43	.49	.268	-1.94
	Male	333	56.6%				
	Female	255	43.4%				
Academic Status		586		1.63	.96	.1.25	.378
	Freshman	348	59.2				
	Sophomore	129	21.9				
	Junior	61	10.4				
	Senior	48	8.2				
GPA		571		3.4	.69	.-82	-.14
	>2.0	3					
	2.0-2.9	58					
	3.0-3.5	216					
	3.6-4.0	294					
Major		584		5.25	3.77	.422	-1.12
	Business	165	28.1%				
	Computer Science	25	4.3%				
	Education	26	4.4%				
	Engineering	90	15.3%				
	Fine Arts	6	1%				
	Health Sciences	72	12.2%				
	Humanities	26	4.4%				
	Information Science, Communication and Journalism	50	8.5%				
	Performing Arts	6	1%				
	Physical Sciences	32	5.4%				
	Social Sciences	36	6.1%				
	Sports Management and Exercise Science	50	8.5%				

4.2 ISMS SCALE VALIDATION

Prior to scale construction, data were screened for normality. As seen in Table 4.2, only a single item representing External Regulation (ExtReg3) had a skewness score

slightly above the 2.0 threshold. However, since all other External Regulation items were normal and the item in question was only slightly higher in skew than the recommended level the item was retained in the final analysis. All items exhibited normal kurtosis levels with only a few approaching the 7 threshold. However, in contrast with other items, amotivation items exhibited consistent high levels of negative skew and kurtosis and the construct was removed from further analysis.

Table 4.2 *ISMS item descriptives*

Variable	N	Mean	SD	Skewness	SE	Kurtosis	SE
ExtReg1	588	1.66	0.797	1.792	0.101	6.356	0.201
IKnow1	586	2.19	0.989	1.14	0.101	2.315	0.202
EIdent1	587	1.75	0.771	1.46	0.101	4.6	0.201
IStim1	587	2.44	1.127	0.96	0.101	1.366	0.201
IAccomp1	586	2.72	1.176	0.643	0.101	0.516	0.202
EIntReg1	588	2.1	0.981	1.139	0.101	2.091	0.201
ExtReg2	587	1.87	0.947	1.731	0.101	4.52	0.201
IKnow2	588	2.38	1.062	0.893	0.101	1.321	0.201
EIdent2	587	1.9	0.865	0.938	0.101	0.962	0.201
IStim2	587	2.99	1.371	0.447	0.101	-0.343	0.201
IAccomp2	587	2.51	1.082	0.643	0.101	0.287	0.201
EIntReg2	587	2.06	0.93	1.184	0.101	2.748	0.201
ExtReg3	588	1.59	0.895	2.137	0.101	6.25	0.201
IKnow3	587	2.58	1.135	0.765	0.101	0.751	0.201
EIdent3	587	1.99	0.884	1.35	0.101	3.545	0.201
IStim3	587	2.95	1.3	0.628	0.101	0.218	0.201
IAccomp3	583	2.79	1.224	0.529	0.101	-0.022	0.202
EIntReg3	587	2.16	0.977	1.02	0.101	1.655	0.201

ExtReg4	587	1.68	0.891	1.651	0.101	3.615	0.201
IKnow4	588	2.3	1.044	0.87	0.101	0.954	0.201
EIdent4	587	2.12	0.947	1.03	0.101	1.744	0.201
IStim4	583	2.82	1.292	0.626	0.101	0.194	0.202
IAccomp4	585	2.54	1.131	0.638	0.101	0.297	0.202
EIntReg4	585	2.19	1.061	1.15	0.101	1.892	0.202

Note: ExtReg= External regulation; EIntReg= Introjected regulation; EIdent= Identified regulation; IAccomp= Intrinsic accomplishment; IKnow= Intrinsic to know; IStim= Intrinsic toward stimulation

Following the univariate normality tests, the data were randomly split into two samples (N=294) and all motivation subscales were tested for reliability using Cronbach's alpha test. All subscales consisted of 4 items each and as seen in Table 4.3, exhibited acceptable levels of reliability ranging from .705 (External Regulation in sample 2) to .884 (Intrinsic Motivation – Stimulation in sample 1). Additionally, the 2 samples exhibited similar levels of reliability and were consistent with the results for the full sample. Consequently, all subscales were retained in confirmatory factor analysis.

Table 4.3 Internal Consistency Results as measured by Cronbach Alpha levels

	Alpha Sample 1 (N = 294)	Alpha Sample 2 (N = 294)	Alpha Full sample (N = 588)
External Regulation	.788	.705	.748
Introjected Regulation	.860	.850	.855
Identified Regulation	.835	.805	.821
Intrinsic Motivation to Know	.865	.852	.859
Intrinsic Motivation - Accomplishment	.880	.810	.850
Intrinsic Motivation - Stimulation	.884	.855	.870

To further minimize the sampling error, confirmatory factor analysis was conducted on the 2 random samples from the previous analysis and the full sample (N=588). Results of analysis for the 2 split samples, available in appendix B, produced similar results with all loadings within acceptable range and the lowest loading at 0.425 which is well above the recommended lowest level of 0.3. Additionally, as seen in Table 4.4 model fit was acceptable and the model was invariant across samples.

Table 4.4 *ISMS CFA model fit*

	Model 1 (N = 294)	Model 2 (N = 294)	Full Model (N = 588)
χ2	447.635	380.610	543.109
df	228	228	233
χ2/df	1.963	1.669	2.330
p	0.000	0.000	0.000
NNFI	0.945	0.955	0.957
CFI	0.955	0.963	0.963
GFI	0.892	0.901	0.926
SRMR	0.041	0.039	0.032
RMSEA	0.057	0.047	0.048

Note. NFI = normed fit index; CFI = comparative fit index; GFI = goodness-of-fit index; SRMR = standardized root mean squared residuals; RMSEA = root means square error of approximation.

Consequently, only the results of the CFA analysis of the full sample are presented in Figure 4.1. Item loadings on latent variables were significant and ranged from 0.55 to 0.85 suggesting that the items represent the latent constructs well. Although Chi-square for the model was significant, all other global fit indices presented in Table 4.4 are all within established acceptable ranges indicating excellent fit. This final acceptable solution was arrived at by using selected modification indices suggestions and

correlating errors between 8 items. As seen in Figure 4.1, errors were correlated only between conceptually similar items (i.e., autonomous motivation items) consistent with the SDT. Additionally, correlated errors were used by Vallerand (1992) in the original version of the Academic Motivation Scale used to construct ISMS.

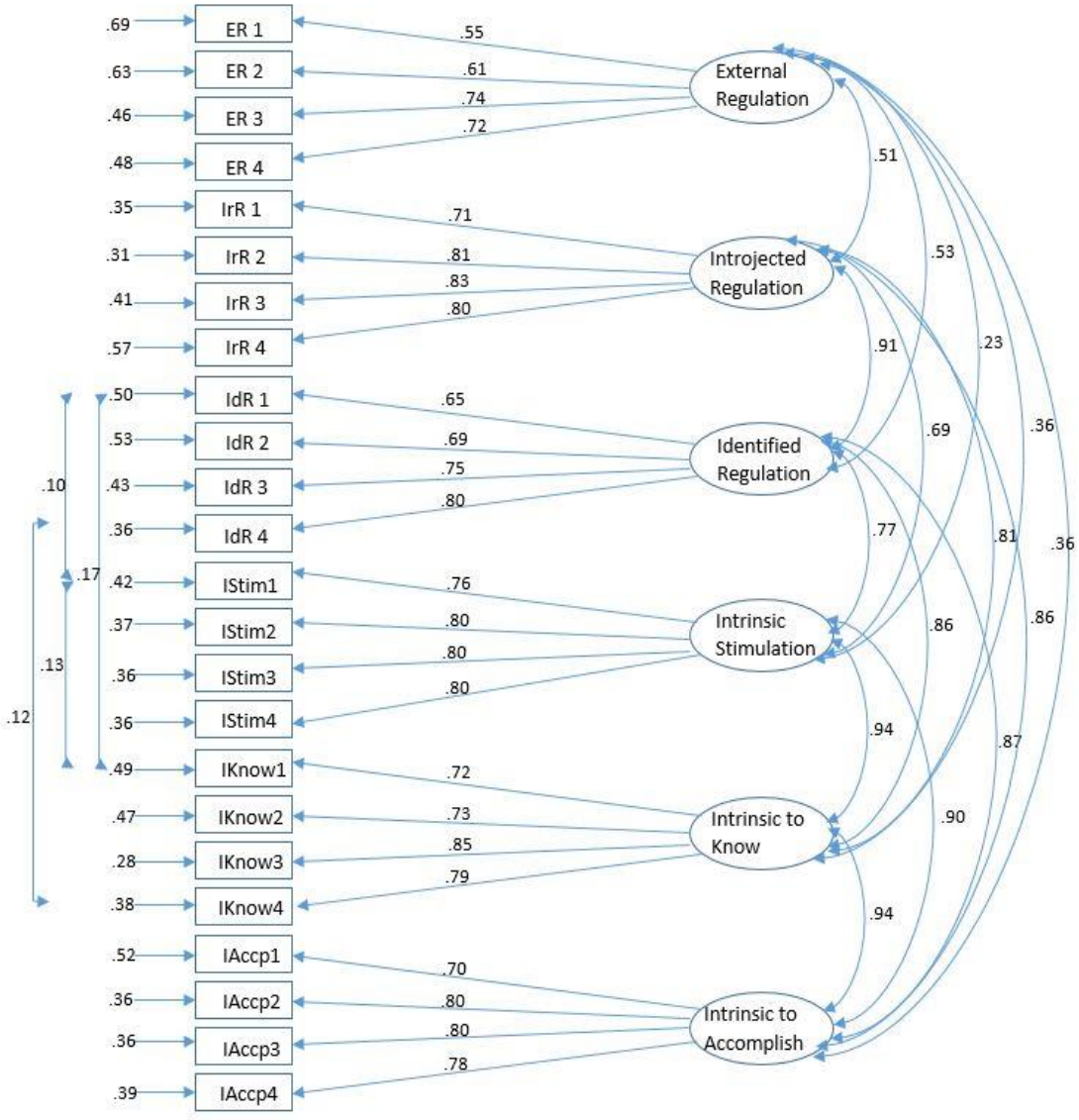

Figure 4.1 *ISMS CFA model (N = 588)*

Finally, results of the subscale correlations presented in table 4.5 indicate the hypothesized SDT simplex pattern was confirmed. Namely, all adjacent subscales were more highly correlated and the correlation levels decreased along the continuum with minor deviations from the pattern. For instance, external regulation correlations with identified regulation (r=.525) was slightly higher than its correlation with the adjacent introjected regulation (r=.510). However, these correlation levels are much higher than correlations between introjected regulation and subscales representing intrinsic motivation ranging from .227 (intrinsic stimulation) to .360 (intrinsic toward accomplishment). Similarly, correlations between the three intrinsic motivation subscales were much higher than their correlations with the 3 extrinsic motivation subscales.

Table 4.5 *ISMS subscales correlations*

Subscale	1	2	3	4	5	6
1 External Regulation	1.000					
2 Introjected Regulation	.510	1.000				
3 Identified Regulation	.525	.905	1.000			
4 Intrinsic Motivation to Know	.355	.806	.858	1.000		
5 Intrinsic Motivation Accomplishment	.360	.865	.867	.933	1.000	
6 Intrinsic Motivation Stimulation	.227	.689	.767	.938	.898	1.000

Note: All correlations were significant at p>0.05

4.3 VALIDATION OF UNIDIMENSIONAL SCALES

All remaining scales used in the current study are unidimensional. As seen in Table 4.5 all scale items exhibited acceptable skewness and kurtosis levels and were consequently included in scale construction.

Table 4.6 Unidimensional Scales Descriptives

Scale Item	N	Mean	SD	Skewness	SE	Kurtosis	SE
Autonomy Support							
AtnSup1	586	2.60	1.181	0.838	0.101	0.843	0.202
AtnSup2	585	2.51	1.092	0.701	0.101	0.469	0.202
AtnSup3	586	2.33	1.075	1.069	0.101	1.654	0.202
AtnSup4	582	2.52	1.227	0.934	0.101	0.984	0.202
AtnSup5	583	2.53	1.159	0.889	0.101	0.911	0.202
AtnSup6	581	2.38	1.158	1.127	0.101	1.688	0.202
Perceived Competence							
PComp1	585	2.59	1.082	0.814	0.101	0.983	0.202
PComp2	585	2.46	1.080	0.992	0.101	1.596	0.202
PComp3	582	2.57	1.098	0.802	0.101	0.932	0.202
PComp4	580	2.53	1.047	0.774	0.101	0.927	0.203
Effort							
Effort1	584	2.85	1.256	0.932	0.101	1.11	0.202
Effort2	583	2.61	1.242	1.085	0.101	1.308	0.202
Effort3	584	2.65	1.231	0.94	0.101	0.895	0.202
Effort4	584	2.88	1.324	0.636	0.101	0.116	0.202
Enjoyment							
Enjoy1	586	2.59	1.197	1.019	0.101	1.385	0.202
Ejoy2	585	2.70	1.216	0.822	0.101	0.803	0.202
Enjoy3	585	3.43	1.495	0.361	0.101	-0.43	0.202
Enjoy4	583	3.15	1.320	0.609	0.101	0.242	0.202

Following data screening, reliability testing was conducted. As seen in Table 4.6, all scales exhibited high alpha levels ranging from .839 to .914, which is well above the recommended .7 cutoff. Consequently, all scales were included in the full model.

Table 4.7 *Unidimensional scales' alpha levels*

Scale	N of items	Mean	SD	Cronbach's Alpha
Autonomy Support	6	14.81	5.751	.914
Perceived Competence	4	10.16	3.534	.839
Effort	4	10.98	4.287	.871
Enjoyment	4	11.87	4.626	.903

4.4 AUTONOMOUS MOTIVATION SCALE VALIDATION

In order to determine if autonomous motivation scale was appropriate for the sample in the current study, second order confirmatory factor analysis was conducted.

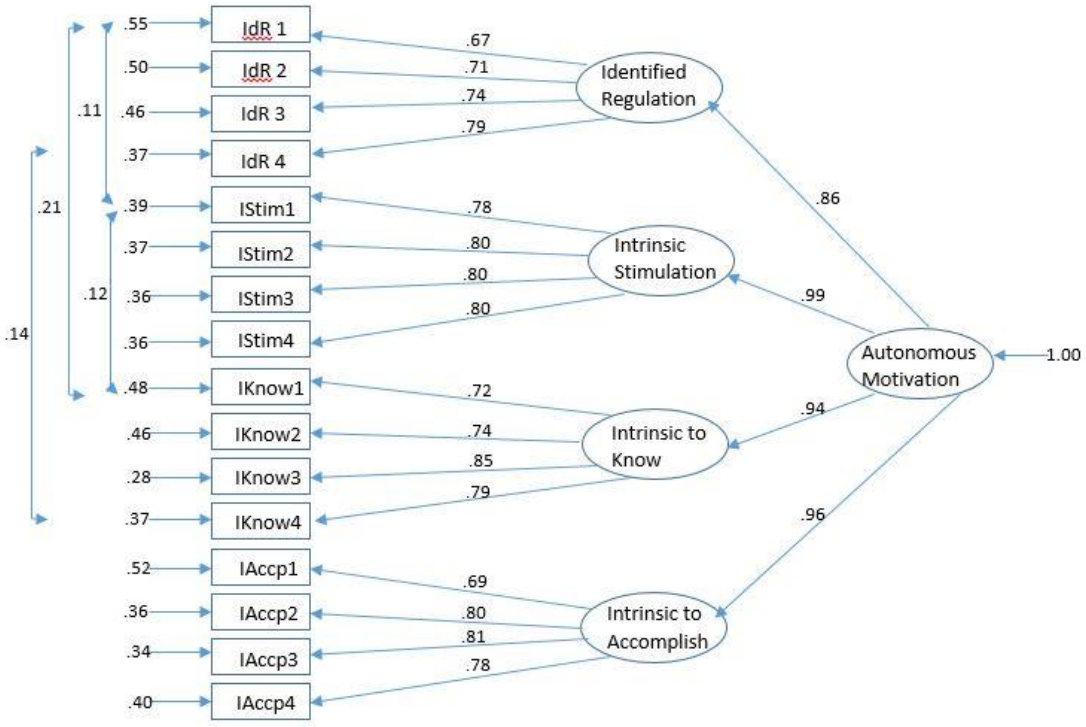

Figure 4.2 *Autonomous motivation second order CFA model*

As seen in Figure 4.2, all second order loadings were high, with lowest at .86. for

identified regulation. Given that the identified regulation represents the self-determined form of extrinsic motivation while the other latent constructs in this model represent intrinsic motivation, the somewhat lower loading was expected. Modification indices were used to add correlated errors also included in the first order CFA analysis for the full ISMS. Despite the significant Chi-square (Chi-square = 249.919, df = 96, $p<0.000$), other global fit indices showed acceptable fit (RMSEA = 0.0520, CFI = 0.975, NNFI = 0.969, GFI = 0.948, SRMR = 0.0296) and the autonomous motivation construct was included in the final model.

4.5 FULL MODEL RESULTS

In order to create autonomous motivation construct, composite variables representing each of the constructs included in the second order CFA analysis were constructed. The procedure was further justified by high Cronbach's Alpha levels for each of the subscales as seen in Table 4.3. Following the construction of autonomous motivation indicator variables, structural equation model was run to assess the relationships between the two basic human needs, autonomous motivation, enjoyment and effort. Autonomy support and perceived competence explained 34.7% variance on autonomous motivation while autonomous motivation, in turn, explained 13.1% of variance of effort and 25.8% variance on enjoyment. Chi-square for the overall model was significant ($\chi 2$= 687.482 df = 196), but other global fit indices support a well-fitting model (NNF I= 0.942, CFI = 0.951, GFI = 0.901, SRMR = 0.066, RMSEA = 0.065).

As seen in Figure 4.3, all structural and measurement coefficients using the completely standardized solution are fairly high indicating a good fit. All coefficients

were significant and all paths were retained in the final model. In line with SDT, the model indicates there is a positive relationship between basic human needs and autonomous motivation. Higher students' autonomy support (β = 0.17, p<0.05) and perceived competence (β = 0.46, p<0.05) levels lead to increase in autonomous motivation to research. Higher autonomous motivation levels, similarly, lead to higher levels of effort (β = 0.62, p<0.05) and enjoyment (β = 0.86, p<0.05). Additionally, indirect interaction effects were also found to be significant. Regarding these effects, perceived competence was found to statically significantly affect effort and enjoyment via the autonomous motivation. Similarly, autonomy support was found to, to a lesser extent, statistically significantly affect both effort and enjoyment.

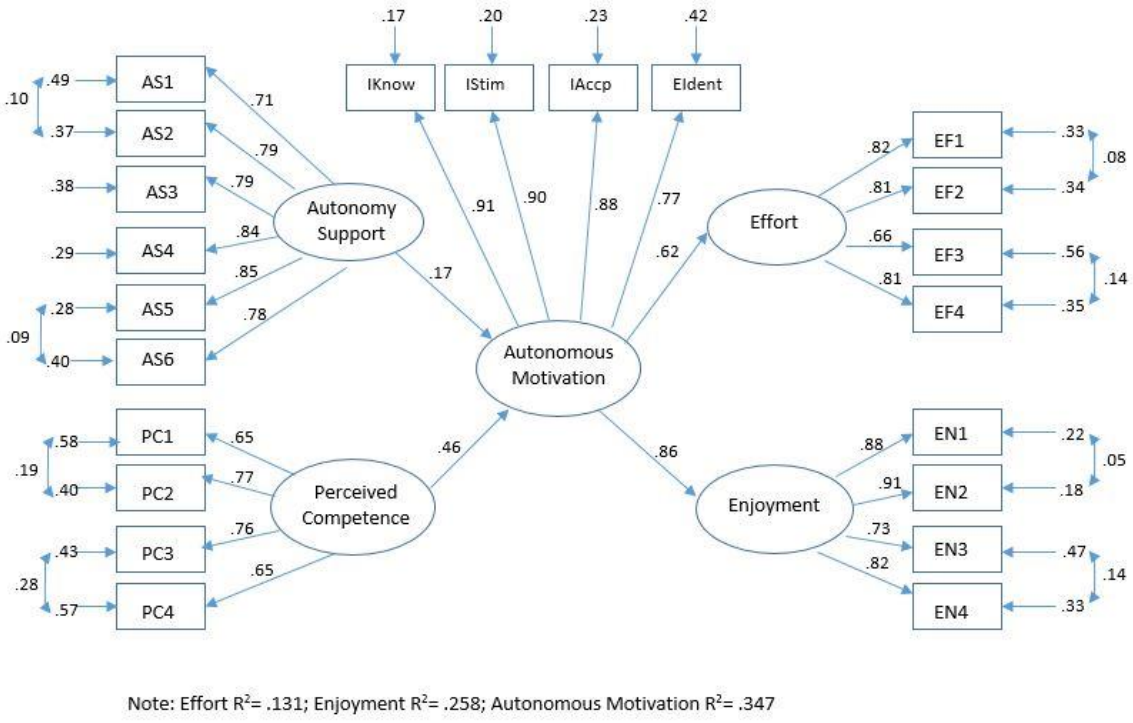

Figure 4.3 *Full model (N = 588)*

The model was also separately tested for fit for male (N=333) and female (N=255) samples. Both models fit the data well and were similar across groups (female $\chi 2$= 415.340 df = 192, NNFI = 0.942, CFI = 0.952, GFI = 0.868, SRMR = 0.072, RMSEA = 0.067; male $\chi 2$ = 557.396 df = 193; NNFI = 0.922, CFI = 0.933, GFI = 0.868, SRMR = 0.073, RMSEA = 0.075). Both structural and measurement coefficient were similar to the overall sample model indicating the model is invariant across gender.

CHAPTER 5

DISCUSSION AND CONCLUSIONS

The current study examined information seeking motivation in undergraduate students at the contextual level through the lens of SDT, one of the most supported motivation theories in psychology. SDT framework also allowed for investigation of the role basic psychological needs play in furthering intrinsic information seeking motivation in undergraduates. Finally, the role autonomous motivation plays in information seeking effort and enjoyment were explored. The following chapter is presented in sections organized around research questions with each section describing conclusions based on analyses' results and research implications.

5.1 RESEARCH QUESTION 1

Research question 1 was "What is the nature of information seeking motivation of undergraduate students at the contextual level?" As discussed in the literature review section, SDT is currently, one of the most accepted need based motivational theories in psychology, which has also been extensively applied in educational setting (e.g., Vallerand et al., 1992; Deci et al., 1991; Fortier et al., 1995) and received extensive cross-cultural support (e.g., Deci et al, 2001). Undergraduate students' information seeking motivation was, therefore, investigated through validation of SDT hypothesized motivational continuum by adapting and validating the Information Seeking Motivation Scale (ISMS). The CFA analysis results suggest ISMS successfully captured

undergraduate students' motivational spectrum, and has proven successful in capturing all hypothesized forms of extrinsic and intrinsic motivation undergraduate students exhibit while engaged in information seeking.

In the context of information seeking, the results imply that undergraduate students approach research tasks for both controlled and autonomous reasons. Students at the far end of the controlled motivational spectrum (i.e., external regulation) engage in their research tasks as a way of avoiding negative consequences or else to satisfy course requirements while those who are extrinsically motivated but closer to autonomous motivation (i.e., identified regulation) understand the benefit of acquiring research skills beyond the immediate project at hand and engage in research in order to acquire skills necessary to be successful as students and in their future careers.

Perhaps more encouragingly, students also displayed all forms of autonomous motivation. The results suggest undergraduate students can and do experience stimulation while researching which in turn motivates them to engage in research for purely internal reasons. Similarly, students are also capable of experiencing a sense of accomplishment and curiosity motivating them to engage in information seeking as its own reward.

Moreover, these motivational orientations in undergraduate researchers seemed to follow the SDT hypothesized continuum. Overall, all forms of intrinsic motivation were more closely related to each other than to any form of extrinsic

motivation and all forms of extrinsic motivation appeared to be more closely related to each other than to any form of intrinsic motivation. This finding not only provides further validation for the scale but also underscores the division between engaging in a research for the sake of successfully completing the research tasks such as finding sources for required course papers (i.e. for controlled reasons) versus experiencing research as an enjoyable activity driven by curiosity, sense of accomplishment it engenders, and the intellectual stimulation it can provide.

These results are consistent with the findings of the AMS (Vallerand et al., 1992) in most respects. Most notable difference was that the amotivation proved difficult to assess with the ISMS, consistently negative skew and kurtosis excluding it from further analysis. It should be noted that the students in the current sample had consistently high grades therefore exhibiting high level of achievement which is inconsistent with amotivation and this could account for the failure to successfully capture the construct.

In contrast with the AMS, the ISMS also found no statistically significant difference in means in intrinsic motivational orientations (i.e., to know, toward accomplishment and stimulation) between genders while the AMS reported slightly higher intrinsically motivated females (Vallerand et al., 1992). External motivational constructs introjected and identified regulation were also significantly higher for females in the AMS study while the ISMS results indicated external, introjected and identified regulation were significantly higher for males. While these results could be impacted by culture, social constraints and demographics and varied slightly even

between French Canadian and English speaking samples across AMS validation studies, it appears that male students might be slightly less intrinsically motivated in their desire to attend college, and also might be more extrinsically motivated to engage in information seeking once in college.

Practical implications of these findings are fairly significant. As discussed in this study, previous research in other contexts (e.g., therapy and sports) not only demonstrated the superiority of autonomous over controlled motivational orientations in terms of wellbeing but also suggested that even though more stable than at situational level, at the contextual level, they tend toward less stability than at the global or personality level. Consequently, autonomous information seeking motivational orientation needs to be cultivated and continually encouraged among undergraduate students at academic institutions. In contrast, activities proven to increase and induce information seeking controlled motivational orientations should be avoided at all times. The ISMS, therefore, represents and invaluable diagnostic tool that can be used to indicate when an intervention is necessary. Specific mechanisms influencing students toward extrinsic and intrinsic motivation are addressed by the second research question discussed in the following section.

5.2 RESEARCH QUESTION 2

Research question 2 was "What is the relationship between relevant basic psychological needs as defined by the SDT (i.e., perceived competence and autonomy support) and intrinsic information seeking motivation?" As discussed in chapter 2, Ryan

and Deci suggest and research confirms (e.g., White 1952 as cited in Ryan and Deci, 2000) that people engage in activities because they enjoy them rather than to increase their sense of autonomy and once controlling elements are introduced their intrinsic motivation is undermined and they tend to abandon the activity for a more enjoyable task. Similarly, when the activity is perceived to be too challenging and the competence felt during the activity is diminished, the intrinsic motivation is reduced and the activity is abandoned for a task that more accurately matches the persons' skillset.

Consistent with previous research, the results of the current study clearly demonstrate there is a positive relationship between autonomous information seeking motivational orientation and both information seeking perceived competence and information seeking autonomy support. This relationship was particularly strong for perceived information seeking competence. Clearly, students who feel more competent in their research skills are more likely to engage in research for autonomous reasons. This finding underscores the importance of bibliographic instruction for undergraduate students as soon as possible. If the students are introduced to relevant research sources and taught how to conduct successful searches their skills are more likely to match their research needs and they will be much more likely to conduct research for autonomous reasons.

However, it should be noted that the bibliographic instruction as currently conceived at most institutions (i.e., as the so called "one shot" sessions) may not be the best way to achieve the desired result. Autonomous motivation promotes feelings of

stimulation, curiosity and accomplishment and if the students learn more than enough research skills to accomplish their research tasks, they will be much more likely to feel less challenged and bored and abandon the task despite feeling competent. Therefore, sustained information literacy efforts accompanied by strategic students' skill assessment are much more likely to aid students in being engaged by their research.

Perceived information seeking autonomy support also proved to significantly positively impact autonomous information seeking motivational orientation. As previously discussed, numerous studies in various settings and particularly in education (e.g., Noel et al., 1999; Assor et al., 2005) demonstrate controlling teachers and other authority figures significantly decreased students' academic motivation. In the information seeking context, this finding indicates group and individual bibliographic instruction session should be designed in such a way as to promote critical thinking in students. Namely, while it is certainly necessary to familiarize students (and this is especially true of novice researchers such as undergraduates) with research databases and other research resources, when it comes to exploring them to further students' research goals less can be more. For instance, once databases are introduced and basic research skills covered, instead of assigning specific research tasks as an in class activity and focusing on research skills as a goal in itself, students should be encouraged to form their own research queries with minimal intervention from their professors and librarians. They should, however, be constantly encouraged to seek help if and when they need it thereby gaining the necessary support.

5.3 RESEARCH QUESTIONS 3 AND 4

Research question 3 was "What is the relationship between autonomous motivation and effort invested in information seeking?" and research question 4 was "What is the relationship between autonomous motivation and enjoyment experienced during information seeking?" One of the most striking and supported ideas introduced by the SDT is that the autonomous motivational orientation can help sustain effort invested in an activity. This is consistent with the organismic-dialectic perspective SDT is anchored in. Humans are seen as growth oriented organisms moving toward mastery of their environment while nurtured by support (i.e. basic need satisfaction) from it.

As discussed in the previous section, controlling environments result in significant decreases in autonomous motivation which in term lead individuals to abandon the activity or reduce effort invested in it. Extensive research in this area confirms this finding in numerous settings from healthcare (e.g., Vallerand and Bissonette, 1992) and environmentalism (e.g., Green-Demers, et al., 1997) to sports (e.g., Chatzisarantis et al., 1997) and politics (e.g., Koestner et al., 1996). In education setting, Ryan and Connell (1989) found that school children, when externally motivated, not only expended less effort on their school tasks but also tended to show less ownership over their results frequently blaming teachers for their failures to accomplish tasks. The exception was introjected regulation which promoted effort but resulted in considerable anxiety and reduction in wellbeing of students.

Current study, not surprisingly, demonstrates a similar link between the information seeking autonomous orientation and effort invested in the information seeking. The

link was much stronger than the link between the basic need satisfaction and autonomous motivation. In the environment where universities are struggling to reduce dropout rates and increase the ranks of graduate students the implications of this finding are clear. Fostering lifetime learning and producing scholars requires an approach that encourages the development of autonomous motivation. According to SDT, humans tend toward growth and are naturally curious and it would appear that the institutions of higher learning need only encourage this natural tendency in order to successfully guide students through their academic endeavors. Funding research collections capable of exposing students to new and fresh ideas, and increasing the ranks of librarians who can provide support for research are, therefore, crucial in increasing student engagement in research.

Similarly, the link between enjoyment and autonomous motivation is inherent in the concept of autonomous motivation (i.e., individuals engage in the activity because they find it enjoyable rather than to pursue a goal or engage in it as a means to an end). Moreover, autonomous motivation has proven to be instrumental in cognitive and social development which, in turn, represent an essential source of enjoyment and vitality throughout life (Ryan, 1995 as cited in Ryan and Deci, 2000). Therefore, the very strong relationship between information seeking enjoyment and autonomous motivation was unsurprising.

Fostering wellbeing and enjoyment in the information seeking activities is clearly as important as information seeking effort. Indeed, research demonstrates there is a

clear link between wellbeing and enjoyment of the activity and the amount of energy invested in the task (Nix et al., 1999). Since the link between the autonomous motivational orientation and enjoyment has now been confirmed in the information seeking context, and while this hypothesis was out of the scope of the current study, it is likely that a link exists between information seeking enjoyment and effort. Currently, libraries are experimenting with numerous initiatives in order to make research more interesting to students. Library spaces are designed with extensive input from student communities, bibliographic instruction activities are assessed in order to involve students in the instructional design and reference services are approached in more flexible ways intended to engage students on their own terms and away from information desks. These efforts are commendable and need to be sustained in order to foster the environment that supports students' research activities in a way that is enjoyable and likely to contribute to their lifelong engagement in research.

5.4 SUMMARY OF RESEARCH IMPLICATIONS

Current study represents a first step in the quest to understand undergraduate students' information seeking motivation at the contextual level. As previously noted, information seeking literature in library and information science field, to date, focused primarily on information seeking at the task level and while these studies provided numerous information seeking models and provided rich understanding of students' information seeking while engaged in a specific research task, the more stable and general contextual motivational orientation operating at the domain level (i.e.,

education) was not addressed nor did any previous study differentiate between extrinsic and intrinsic information seeking motivational orientations.

Additionally, although the focus of most motivational studies at the task level centered on information seeking needs, the link between higher level basic psychological needs and motivation went unexplored. Since, those needs play a large role in students' motivational orientation the current study represents a significant step forward in understanding the antecedents of information seeking motivational orientation in undergraduate students. Finally, while few studies in library and information science explored affect in connection with information seeking during research (e.g., Kuhlthau's ISP Model), none were able to make empirical connections between information seeking motivational orientations and information seeking effort and enjoyment. Consequently, the current study is the first to provide a comprehensive picture of students' information seeking motivation from basic need satisfaction through motivational orientations to effort and enjoyment.

The ISMS should prove an invaluable diagnostic tool for teachers and librarians in evaluating students' motivational orientation. Additionally, the causes of high scores on extrinsic motivation continuum can be further investigated using information seeking basic psychological need scales validated in the current study in order to plan successful interventions. For instance, if students' scores on information seeking autonomy support are found to be low, research assignments could be reevaluated and revised to include more positive language focusing on the research experience rather than grading

rubrics and points for specific tasks. Alternatively, if the information seeking competence scores were found to be low, students could be encouraged to seek research help from librarians or peers.

The information seeking enjoyment and effort scores in conjunction with the ISMS scores demonstrating the link between intrinsic motivational orientation and effort and enjoyment could be used by teachers, librarians and administrators as a tool to encourage more institutional support for classroom environments that encourage free thinking and mentoring.

The importance of encouraging intrinsic motivational orientation in students is difficult to overestimate as study after study demonstrates detrimental effects of extrinsic motivational orientation in various contexts. The current study confirmed SDT applies in information seeking context. Therefore, by extension, extrinsically motivated students are likely to feel alienated and passive and will be far less likely to take advantage of any but most basic research sources offered by their institution. They will be also less likely to explore new, ever evolving search features. Intrinsically motivated students, in contrast, will be far more likely to experience the information seeking process as a playful journey as they continue on the way to becoming lifelong researchers. In the current social climate, where every professional needs to continue perfecting skills in order to keep up with the changes introduced by evolving technologies, cultivating internal (i.e. intrinsic) motivational orientation represents the best way to ensure those research habits are lasting and eudemonic.

5.5 SELECTED PRACTICAL APPLICATIONS

Given its focus on undergraduate students, the results of the current study are very much applicable to a number of educational settings. Indeed, it would seem many new classroom initiatives are compatible with the SDT framework and could benefit from the findings of the current study. For instance, to address science teaching and learning in large classroom environments, Student-Centered Active Learning Environment with Upside-down Pedagogies (SCALE-UP) was developed at North Carolina State University. The instruction in a SCALE-UP classroom centers on a problem-based format in which students work collaboratively to make observations and to analyze experimental results mirroring the scientific process. The process has since spread to many other disciplines outside science and proved equally valuable.

While studies show students taught in SCALE-UP classrooms are better problem solvers and demonstrate much higher success rates in additional science courses as well as better understanding of underlying scientific concepts than students taught in traditional lecture classrooms, in order to reap maximum benefit from this teaching format, teachers would need to investigate the specific mechanisms that facilitate the improvements. SDT based measurement tools developed in the current study can provide the tools to accomplish that.

For instance, one of the most significant differences between SCALE-UP and the traditional lecture environment is the collaborative nature of learning. If research on assignments becomes collaborative in nature, it is likely that the stronger sense of

relatedness among students as well as increases in perceived research competence are driving increases in intrinsic research motivations thereby producing increases in effort and enjoyment.

Equally likely, teachers as facilitators of learning in a SCALE-UP classroom are more likely to support students' autonomy inside the classroom than would be possible in the traditional lecture environment. However, until students are tested and baselines established, the exact mechanisms and their consequences are difficult to pinpoint and further improvements in students' research skills are likely very possible. For instance, if some students were shown to score lower on perceived competence, the assignments could be modified to induce increases in those scores (e.g., research groups could be assigned leaders and students with lower perceived competence scores could be assigned leader/facilitator roles).

Distance education programs as currently conducted in most institutions of higher learning could potentially reap even greater rewards from the application of SDT measurement tools. While distance programs offer unprecedented access to education for nontraditional students who can now attend classes on their own time schedule, or students in remote geographic regions, unlike SCALE-UP classrooms, students attending online classes have only limited interactions with their peers and instructors, especially if the classes taught are asynchronous. Such learning environments are likely to induce drops in relatedness scores but could also potentially affect students' perceived

competence if the research guidance and feedback they receive as part of the course is infrequent or seen as impersonal.

However, some students may thrive in such environments buoyed by the increases in perceived autonomy support. Without conducting tests and administering measurement instruments, it would be difficult to diagnose potential issues before the end of the term when students' lack of engagement would manifest in low quality research assignments resulting in lower grades. To prevent potential issues, students could be tested during the first month of the semester and interventions could be implemented.

For instance, if the relatedness scores were found to be low, students could be asked to participate in chatroom discussions sharing their research successes and ideas for improvement with their peers thereby developing closer bonds with other students in the course. If the perceived competence scores were found to be low in some students, those students would be good candidates for extra attention and guidance through the research process. Students with lower autonomy support scores could be encouraged to find additional sources of their own choosing or assignments for the course could be modified in such a way as to encourage students to tailor research assignments according to their interests.

Gains in scores on any basic psychological need would be established by conducting posttests at the end of the term. Lessons learned could then be applied to future courses where additional improvements could be introduced and tested. The

iterative nature of the process would benefit the instructional design in number of additional ways. For instance, new technologies promoting basic need satisfaction during research could be identified and best ways of interacting with students in an online environment inducing gains in intrinsic research motivational orientation could be discovered.

5.6 FURTHER RESERCH RECOMMENDATIONS

The current study is the first study in information science to explore information seeking using SDT framework and the area remains rife for exploration. The possibilities are endless and the suggestions presented in this section are limited to most pressing questions building on the current study followed by suggestions for additional applications of SDT in the information seeking context.

Building on the current study, the ISMS should be tested on additional samples to determine if the consistently negative kurtosis and skew of the amotivation construct would improve or if subscale modifications are needed. Current study also found ISMS to be invariant across gender but since nearly half of the sample consisted of freshmen, invariance across academic status could only be tested between freshmen and upper classmen. Further study needs to be done do determine if ISMS invariance for sophomores, juniors and seniors.

In regards to next steps, research has shown that the effects of basic psychological need thwarting result in significant reduction in autonomous motivation and this remains to be explored in the information seeking context. Similarly, while the

current study clearly demonstrates the positive effect of autonomous motivational orientation on information seeking effort and enjoyment, the effects of controlled motivation remain unexplored. In contrast with autonomous motivation, controlled motivation is hierarchical (i.e., appears on a continuum) and some forms (e.g., introjected regulation) have proven to have positive effect on effort invested in the activity in the education context even if the enjoyment in the activity was compromised.

As discussed in the current study, goal content in SDT realm can be considered extrinsic and intrinsic and what is pursued is as important as motives. In the information seeking context, an important line of research would be to study the effects of information seeking in pursuit of acquiring knowledge (i.e., intrinsic goals) versus achieving success as a student or professional success (i.e., extrinsic goals) on students' wellbeing. Finally, since the current study focuses on information seeking at the contextual or domain level, situational information seeking motivation remains unexplored. Scales exploring it need to be adapted and validated. This research would, in turn, allow for connections between contextual and situational information seeking to be empirically tested.

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APPENDIX A

DEMOGRAPHIC QUESTIONS

1. What is you sex/gender?
    a. Male
    b. Female
2. What is your major?
    a. Business
    b. Computer science
    c. Education
    d. Engineering
    e. Fine arts
    f. Health sciences
    g. Humanities
    h. Information science, communications and journalism
    i. Performing arts (theater, dance, media arts, film and music)
    j. Physical sciences
    k. Social science

l. Sports management and exercise science

3. What is your academic status?

    a. Freshman

    b. Sophomore

    c. Junior

    d. Senior

4. What is your overall GPA?

    a. Less than 2.0

    b. 2.0-2.9

    c. 3.0-3.4

    d. 3.5-4.0

APPENDIX B

ISMS RANDOMLY SPLIT SAMPLES' LOADINGS

Confirmatory factor analysis (CFA) completely standardized loadings (Sample 1, N= 294)

	External Regulation	Introjected Regulation	Identified Regulation	Intrinsic Motivation to Know	Intrinsic Motivation Accomplishment	Intrinsic Motivation Stimulation
External Regulation 1	.619					
External Regulation 2	.601					
External Regulation 3	.769					
External Regulation 4	.777					
Introjected Regulation 1		.684				
Introjected Regulation 2		.883				
Introjected Regulation 3		.823				
Introjected Regulation 4		.792				
Identified Regulation 1			.684			
Identified Regulation 2			.708			
Identified Regulation 3			.796			
Identified Regulation 4			.791			
Intrinsic Motivation to Know 1				.742		
Intrinsic Motivation to Know 2				.770		
Intrinsic Motivation to Know 3				.886		

Intrinsic Motivation to Know 4				.773		
Intrinsic Motivation – Accomplishment 1					.755	
Intrinsic Motivation – Accomplishment 2					.810	
Intrinsic Motivation – Accomplishment 3					.842	
Intrinsic Motivation – Accomplishment 4					.812	
Intrinsic Motivation – Stimulation 1						.806
Intrinsic Motivation – Stimulation 2						.805
Intrinsic Motivation – Stimulation 3						.827
Intrinsic Motivation – Stimulation 4						.813

Confirmatory factor analysis (CFA) completely standardized loadings (Sample 2, N= 294)

	External Regulation	Introjected Regulation	Identified Regulation	Intrinsic Motivation to Know	Intrinsic Motivation Accomplishment	Intrinsic Motivation Stimulation
External Regulation 1	.425					
External Regulation 2	.572					
External Regulation 3	.687					
External Regulation 4	.710					

Introjected Regulation 1	.737				
Introjected Regulation 2	.783				
Introjected Regulation 3	.855				
Introjected Regulation 4	.749				
Identified Regulation 1		.640			
Identified Regulation 2		.669			
Identified Regulation 3		.705			
Identified Regulation 4		.822			
Intrinsic Motivation to Know 1			.688		
Intrinsic Motivation to Know 2			.712		
Intrinsic Motivation to Know 3			.845		
Intrinsic Motivation to Know 4			.816		
Intrinsic Motivation – Accomplishment 1				.624 .780	
Intrinsic Motivation – Accomplishment 2				.744 .750	
Intrinsic Motivation – Accomplishment 3					
Intrinsic Motivation – Accomplishment 4					
Intrinsic Motivation – Stimulation 1					.752
Intrinsic Motivation – Stimulation 2					.794
Intrinsic Motivation – Stimulation 3					.769
Intrinsic Motivation – Stimulation 4					.794

Confirmatory factor analysis (CFA) completely standardized loadings (Full sample, N= 588)

	External Regulation	Introjected Regulation	Identified Regulation	Intrinsic Motivation to Know	Intrinsic Motivation Accomplishment	Intrinsic Motivation Stimulation
External Regulation 1	.554					
External Regulation 2	608					
External Regulation 3	.735					
External Regulation 4	.721					
Introjected Regulation 1		.710				
Introjected Regulation 2		.806				
Introjected Regulation 3		.833				
Introjected Regulation 4		.770				
Identified Regulation 1			.653			
Identified Regulation 2			.688			
Identified Regulation 3			.753			
Identified Regulation 4			.800			
Intrinsic Motivation to Know 1				.716		
Intrinsic Motivation to Know 2				.731		
Intrinsic Motivation to Know 3				.851		
Intrinsic Motivation to Know 4				.789		
Intrinsic Motivation – Accomplishment 1					.696	
Intrinsic Motivation – Accomplishment 2					.798	
Intrinsic Motivation – Accomplishment 3					.797	
					.784	

Intrinsic Motivation – Accomplishment 4	
Intrinsic Motivation – Stimulation 1	.760
Intrinsic Motivation – Stimulation 2	.796
Intrinsic Motivation – Stimulation 3	.800
Intrinsic Motivation – Stimulation 4	.802