EXPLORING IMPULSIVITY WITHIN THE ENTREPRENEURIAL CONTEXT

by

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Where your fear is, there is your task.

-Carl G. Jung

This thesis represents a mere portion of my learning and development as a doctoral scholar over the preceding three years. The culmination thereof has been fundamentally tied to and reliant on the gracious time and support of several individuals throughout my journey. While no statement of appreciation can adequately reflect my gratitude to all those who have supported me, I would like to briefly relay my deep appreciation to the following people:

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LIST OF ABBREVIATIONS

Unless specified otherwise in the text, the following abbreviations apply:

AA	Anticipated Affect
ADHD	Attention-deficit/hyperactivity disorder
AIC	Akaike Information Criterion
AVE	Average Variance Extracted
BIC	Bayesian Information Criterion
CB-SEM	Covariance-Based Structural Equation Modelling
CEST	Cognitive–Experiential Self-Theory
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CI	Confidence Interval
CMV	Common Method Variance
CMB	Common Method Bias
CR	Composite Reliability
D	Log-likelihood ratio test
DF	Degrees of Freedom
DVSF	Salience Placed on Desirability Versus Feasibility
EBE	Entrepreneurial Behaviour Expectations
EE	External Enabler
EFA	Exploratory factor analysis
EFT	Emotion-as-Feedback Theory
EI	Entrepreneurial Intention
EL	Entrepreneurial Learning
FFM	Five Factor Model
IFI	Incremental Fit Index

IV	Instrumental Variable
LLCI	Lower-Level Confidence Interval
LMS	Latent-Moderated Structural Equations
M	Mean
N	Number
NA	Negative Affect
NS	Nonsignificant
PA	Positive Affect
PAF	Principal Axis Factoring
PT	Prospect Theory
REI	Rational-Experiential Inventory
RMSEA	Root Mean Square Error of Approximation
RST	Reinforcement Sensitivity Theory
SD	Standard Deviation
SDB	Social Desirability Bias
SE	Standard Error
SME	Small and Medium Enterprise
SEM	Structural Equation Modelling
SRMR	Standardised Root Mean Residual
TBP	Thesis-by-publication
TEA	Total Entrepreneurial Activity
TG	Toxoplasma Gondii
TLI	Tucker-Lewis Index
ULCI	Upper-Level Confidence Interval
UPPS	Urgency, Premeditation, Perseverance and Sensation seeking
U.S.	United States of America

U.K.	United Kingdom
VIF	Variance Inflation Factor
VIQ	Venture Idea Quality

Glossary

The following definitions of terms are used for the purposes of this TBP:

Anticipated affect	Forecasted assessment of the affect expected in the future.
Article	A paper in this TBP that has been accepted for publication by a journal.
Analysis	Emotion-neutral, cause-effect Type reasoning.
Current affect	Affect experienced in the moment.
Discounting	The extent to which variation along one decision dimension is associated with the disregard of another decision dimension (Green & Myerson, 2013).
Disinhibition	A lack of engagement of analytical Type processing.
EBE	Self-predicted likelihood of engaging in entrepreneurial behaviour.
External Enabler	A condition, element or thing that facilitates new venture creation.
Entrepreneurial Learning	Proficiency at effectively adapting to feedback in the entrepreneurial domain.
Impulsiveness	Action "on immediate urges, either before… or despite consideration of negative consequences" (DeYoung & Rueter, 2010:487).
Impulsivity	An umbrella construct used to describe traits that may, in certain contexts, encourage a proclivity for rapid reactions to internal and external stimuli without forethought, reasoning or deliberation of the consequences of those reactions.
Hedonic Impulses	Hyper-activated intuitive processing resulting in "affectively charged judgments that arise through rapid, non-conscious, and holistic associations" (Dane & Pratt, 2007:40).

New Venture Idea	The content of what others have termed ‘opportunity’, reflecting the imagined future “combinations of product/service offerings, markets, and means of bringing these offerings into existence” (Davidsson, 2015:675).
Opportunity Desirability	Degree of attraction towards the reward of an opportunity.
Opportunity Feasibility	Degree of practicability associated with an opportunity.
Paper	A research manuscript which is submitted or under review at a journal but has not yet been published.
Study	A term used to represent one particular dataset and concomitant analysis. One research paper may have employed more than one study to answer its research question.
Thesis-by-publication	A PhD thesis compiled and presented as a collection of publishable papers and undertaken as a student of a PhD programme.
Unreasoned behaviour	Behaviour, whether intended or not, which is not governed or restrained by effortful deliberation or consideration of the consequences.
Venture Idea Quality	The commercial potential of a venture idea.

ABSTRACT

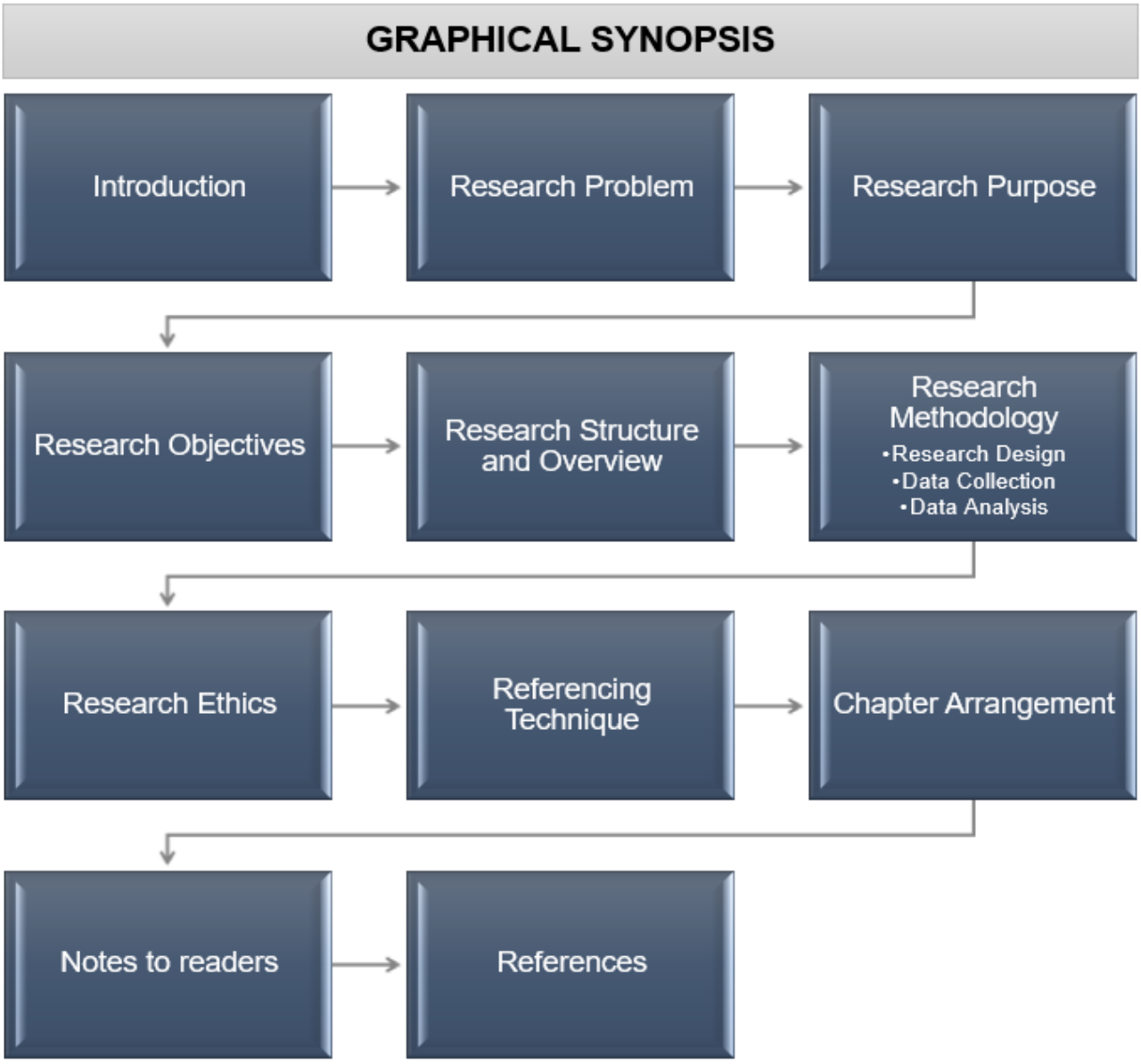
Exploring impulsivity within the entrepreneurial context

Emerging evidence of a trait impulsivity-entrepreneurial action link has prompted reconsideration of the mainstream assumption that entrepreneurship is always a reasoned and rational endeavour. However, this research remains in its infancy and has yet to articulate mechanisms explaining the link from an unreasoned perspective and has yet to draw implications for a broader range of entrepreneurial outcomes. Without more extensive investigation of the impulsivity-entrepreneurship link, scholars remain unable to understand the true role of impulsivity and form solutions to augment its effects in entrepreneurship. The purpose of this thesis-by-publication is to fill this void by exploring various cognitive mechanisms as explanations, from an unreasoned perspective, for the effect of impulsivity on entrepreneurial behaviour, idea quality, and learning. Three distinct yet mutually informative papers are presented in this thesis-by-publication, each with its own explanatory model. Article 1 presents a model demonstrating that in contrast to the incumbent assumption that all entrepreneurial behaviour ought to be considered a rational undertaking, a material portion of entrepreneurial behaviour does, in fact, stem from a lack of reasoning. Paper 2 advances understanding of these less reasoned processes while illustrating the implications thereof for the quality of the idea pursued. Finally, Paper 3 further unpacks these less reasoned processes from the perspective of entrepreneurial learning. A variety of data sources were used, including prospective survey data among owner-managers (i.e., two waves; wave 1: n=807; wave 2: n=228), and a novel, multi-source experiment among Amazon Mechanical Turk participants (n=204) and independent expert idea raters (n=2). Using these data sources, the veracity of the theorised explanatory models were rigorously tested using a range of covariance-based and latent-moderated structural equation modelling techniques. In so doing, this research offers novel and useful insights into the impulsivity-entrepreneurship relationship by explaining–through a variety of mechanisms and conditional processes–the implications of impulsivity for entrepreneurial behaviour, idea quality, and learning. Overall, this thesis-by-publication advances theories of impulsivity, reasoning, and rationality in the entrepreneurial context while offering broader prescriptive implications, based on individuals' impulsivity levels, for augmenting key entrepreneurial outcomes in both entrepreneurial and more traditional corporate contexts.

Keywords–Impulsivity, entrepreneurial behaviour, impulsivity-entrepreneurship link, venture idea quality, entrepreneurial learning, uncertainty, discounting, reasoning processes

CHAPTER 1:

THESIS INTRODUCTION, PROBLEMATISATION, PURPOSE AND METHODS



Chapter 1 provides an overview of this Thesis-by-publication (TBP) and the research undertaken. Since this thesis is presented as a collection of publishable papers, the aim of Chapter 1 is to show the common problem and purpose underlying the papers. As illustrated in the graphical synopsis, Chapter 1 offers an overarching introduction, problematisation of the domain of inquiry, articulation of the purpose emerging from the problem, and details on the objectives, research papers, and methodologies employed to address the problem.

1.1 INTRODUCTION

Extant research has investigated the effects of various entrepreneur characteristics on decision-making under uncertainty (Frese & Gielnik, 2014:413). However, the focus has largely centred on the entrepreneur as a reasoned, rational decision-maker (Lerner, 2016:235), and as someone characterised by positively valenced personality traits, such as extraversion and conscientiousness (Miller, 2015:1-3). In contrast, a relative paucity of attention has been given to less reasoned, impulse-driven decisions, and negatively valenced traits, such as impulsivity in explaining entrepreneurial phenomena (Antshel, 2018:243; Lerner, Hunt & Dimov, 2018b:52; Wiklund, Yu & Patzelt, 2018b:3).

Impulsivity is a trait that refers to "a predisposition toward rapid, unplanned reactions to internal or external stimuli without regard to the negative consequences of these reactions" (Moeller, Barratt, Dougherty, Schmitz & Swann, 2001:1784). Hence, the trait is associated "non-intendedly rational", or unreasoned action (Lerner *et al.*, 2018b:52-69). Following a stream of research beginning to investigate the phenomenon in entrepreneurship (Hunt and Lerner, 2018:1; van Lent, Hunt and Lerner 2021:3; Wiklund, 2019:1), unreasoned action is viewed as action, whether intended or not, which is not governed or restrained by effortful deliberation or consideration of the consequences (Carver, 2005:313; Evans, 2008:258; Hofmann, Friese and Strack, 2009:162). In this view, an individual may or may not be consciously aware of the potential consequences of their behaviour, and they may or may not believe their behaviour is appropriate, yet they engage in behaviour which can nevertheless be characterized by a lack of regard for potential long-term consequences (i.e., unreasoned; Wiklund, 2019:2).[1]

In the light of this unreasoned view, impulsivity has generally been positioned as having negative implications for actors and decision quality (Ainslie, 1975:463). For example, previous work has associated impulsivity with maladaptive behaviour (Ainslie, 1975), including reckless driving and motor vehicle accidents (Cheng & Lee, 2012:535; Teese & Bradley, 2008:105), compulsive exercise (Carlson, 2008:1), substance abuse (Adams, Kaiser, Lynam, Charnigo & Milich, 2012:848; Kreek, Nielsen, Butelman & LaForge, 2005:1450), criminality (Ellis, Cooper & Walsh, 2008:3323), gambling (Alessi & Petry, 2003:345; Berg, Latzman, Bliwise & Lilienfeld, 2015:1129), and the incursion of higher levels of unsecured debt (Ottaviani & Vandone, 2011:754). The trait has been linked to poor work

(Moeller *et al.*, 2001:1783) and poor academic performance (Colom, Escorial, Shih & Privado, 2007:1503), which suggest an inappropriate fit in traditional workplace contexts (Antshel, 2018:243; Kessler, Lane, Stang & Van Brunt, 2009:137). However, despite these maladaptive outcomes, emerging research suggests that, at least in the early venturing stages, the trait may be salient and beneficial in the entrepreneurial context, potentially explaining tendencies toward entrepreneurial behaviour under uncertainty via a less reasoned pathway (Hunt & Lerner, 2018:2352; Shepherd, Williams & Patzelt, 2015:487-497; Wiklund, Patzelt & Dimov, 2016:14). Table 1.1 outlines influential empirical work that has developed this emerging domain and suggested the relevance of further exploring unreasoned (or impulsive) entrepreneurial pathways that deviate from the predominant view of the entrepreneur as a rational actor.

Table 1.1: Overview of empirical impulsivity-entrepreneurship research suggesting unreasoned entrepreneurial pathways as a relevant line of inquiry

Authors	Sample	Design	Independent variable(s)	Dependent variable(s)	Mediating mechanism(s)	Findings
Dimic and Orlov (2014)	270 adults, some with diagnosed ADHD, others without	Cross-sectional survey	Self-reported ADHD symptoms	Academic entrepreneurial preference	None	Attention-deficit symptoms were negatively related to academic entrepreneurial preference.
Verheul, Block, Burmeister-Lamp, Thurik, Tiemeier and Turturea (2015)	10,104 university students in the Netherlands	Cross-sectional survey	Self-reported ADHD symptoms	EI	Risk-taking propensity and need for independence	ADHD was positively associated with EI. Risk-taking propensity partially mediates this effect.
Lerner, Crawdford, Bort and Wiklund (2017)	Agent-based simulation, validated with Panel Study of Entrepreneurial Dynamics data	Simulation experiment	Impulsivity, conceptualised as disinhibition and manipulated through an agent-based simulation	Business emergence, disbanding, growth	None	Disinhibited actors were less likely to successfully start a business but, of those who successfully start a business, impulsive actors are more likely to achieve higher growth.
Wiklund, Yu, Tucker and Marino (2017)	545 MBA Alumni from US business schools	Prospective survey	Self-reported multidimensional impulsivity and ADHD symptoms	Entrepreneurial preference, business start-up	Impulsivity	Impulsivity mediated the relationship between ADHD and entrepreneurial preference.
Lerner, Verheul and Thurik (2018d)	9,800 university students from the Netherlands	Cross-sectional survey	Self-reported clinical ADHD diagnosis	EI, entrepreneurial action	None	ADHD was positively related to EI and action.
Lerner, Hatak and Rauch (2018a)	Study 1: 132 bachelor students Study 2: 99 founders	Cross-sectional surveys	Self-reported behavioural inhibition and activation sensitivity	Entrepreneurial action, venture performance	None	Behavioural activation, which appears to underlie impulsivity, significantly increased entrepreneurial action. No significant effect was observed on performance.

Authors	Sample	Design	Independent variable(s)	Dependent variable(s)	Mediating mechanism(s)	Findings
van Gelderen, Kibler, Kautonen, Munoz and Wincent (2018b)	450 Swedish adults	Cross-sectional survey	Self-reported trait mindfulness	Entrepreneurial action	None	A lack of mindfulness was positively related to entrepreneurial action.
Canits, Bernoster, Mukerjee, Bonnet, Rizzo and Rosique-Blasco (2019)	534 academic researchers in Europe	Cross-sectional survey	Self-reported ADHD symptoms	Academic entrepreneurial preference	None	Impulsivity symptoms of ADHD were negatively related to academic entrepreneurial preference, while no relationship was found for hyperactivity symptoms.
Hatak, Chang, Harms and Wiklund (2020)	164 Dutch Entrepreneurs	Cross-sectional survey	Self-reported ADHD symptoms and passion	Entrepreneurial performance	None	ADHD symptoms are associated with higher entrepreneurial performance, when the individual simultaneously exhibits high passion for developing and founding a venture, but low passion for recognising opportunities.
Walker, Jackson, and Sovereign (2020)	Study 1: 157 full-time American workers Study 2: 143 Australian university workers	Experiment	Impulsivity, captured through the Balloon Analogue Risk Task	EI	None	Impulsivity associated with greater EI.
Wismans, Thurik, Verheul, Torrès and Kamei (2020)	802 small firm owners in France	Cross-sectional survey	Self-reported ADHD symptoms	Entrepreneurial orientation	None	Hyperactivity/impulsivity symptoms of ADHD were positively related to entrepreneurial orientation, predominantly through the risk-taking and pro-activeness dimensions. No link was found between attention-deficit symptoms and entrepreneurial orientation.

Authors	Sample	Design	Independent variable(s)	Dependent variable(s)	Mediating mechanism(s)	Findings
Greidanus and Liao (2021)	7 795 members of the Panel Study of Income Dynamics	Prospective panel data	Self-reported ADHD symptoms	Business venturing, entrepreneurial performance, persistence	None	Untreated ADHD associated with increased business ownership, decreased performance, and increased persistence (ownership spell length).
Gunia, Gish and Mensmann (2021)	Study 1: 350 prolific academic users Study 2: 299 MTurk users Study 3: 100 Qualtrics participants Study 4: 184 practising entrepreneurs	Study 1: experiment Studies 2-3: cross-sectional surveys	Self-reported sleep quality	EI	Self-reported ADHD symptoms	ADHD symptoms mediate the positive effect of poor sleep quality on EI.
Lerner, Alkærsig, Fitza, Lomberg and Johnson (2021)	16 068 Danish women	Prospective multi-source data	Toxoplasma gondii (TG) parasite infection	Probability of entrepreneurial entry, persistence, performance	None	TG parasite infection (which is known to heighten impulsivity) increases the probability of entrepreneurial entry, decreases persistence (measured via duration of business ownership), and increases performance.
Moore, McIntyre and Lanivich (2021)	581 entrepreneurs	Cross-sectional survey	Self-reported ADHD symptoms	Intuitive cognitive style (captured by a lack of analysis), entrepreneurial alertness, entrepreneurial metacognition, Resource-induced Coping Heuristic (RICH)	None	ADHD increased intuitive cognitive style, entrepreneurial alertness and RICH, but decreased entrepreneurial metacognition.

Authors	Sample	Design	Independent variable(s)	Dependent variable(s)	Mediating mechanism(s)	Findings
Patel, Rietveld and Verheul (2021)	7 905 Americans aged 50 and higher	Prospective multi-source data	ADHD ploygenic risk score	Earnings	Self-employment	ADHD polygenic risk score (a predictor of ADHD symptoms and diagnosis) increases likelihood of being self-employed which, in turn, is associated with a decrease in yearly earnings.
Rajah, Bamiatzi and Williams (2021)	11 237 participants of the British Cohort Survey	Prospective multi-source data	Teacher-rated (i.e., rated by a third-party) ADHD symptoms at age 10	Selection into entrepreneurship, business survival, take-home earnings	None	ADHD symptoms are positively associated with selection into entrepreneurship but are negatively associated with business survival and earnings.
Stappers and Andries (2021)	726 Belgian adults	Cross-sectional survey	Self-reported ADHD symptoms	EI, entrepreneurial behaviour	EI	While both inattentiveness and hyperactive/impulsive symptoms positively relate to EI, only impulsive symptoms drive entrepreneurial behaviour.
Tucker, Zuo, Marino, Lowman and Sleptsov (2021)	243 American MBA Alumni	Prospective survey	Self-reported ADHD symptoms	Tendency to recognise opportunities	Entrepreneurial self-efficacy	Inattentiveness symptoms were negatively related to ESE, resulting in a negative indirect effect on opportunity recognition. No significant direct or indirect effects were found for hyperactive/impulsive symptoms.
Yu, Wiklund and Pérez-Luño (2021)	Study 1: 242 Young Presidents' Organisation members Study 2: 105 Spanish winery entrepreneurs	Cross-sectional survey	Self-reported ADHD symptoms	Firm performance	Entrepreneurial orientation	Hyperactivity/impulsivity symptoms of ADHD were positively related to entrepreneurial orientation which, in turn, positively mediated the effect on both subjective and objective measure of firm performance.

Source: Own compilation.

An important commonality is evident across this work; trait impulsivity (Wiklund *et al.*, 2017:627), and associated predispositions, like attention-deficit/hyperactivity disorder (ADHD; Lerner *et al.*, 2018d:381; Wismans, Thurik, Verheul, Torrès & Kamei, 2020:1093), and a lack of mindfulness (van Gelderen *et al.*, 2018b:489), all appear to drive early-stage entrepreneurial interest and engagement. Although ADHD has been the focus of the majority of this work, interestingly, the hyperactivity/impulsivity, rather than the attention-deficit, facet of ADHD appears to relate most robustly and positively to early entrepreneurial interest and engagement. Indeed, Wiklund *et al.* (2017:627) found that impulsivity appears to be the primary, or at least the common underlying trait explaining the effects of ADHD on entrepreneurial action. Impulsivity also appears to relate closely to a lack of mindfulness (Peters, Erisman, Upton, Baer & Roemer, 2011:228) and poor sleep quality (Gunia *et al.*, 2021:186), both of which have been associated with greater entrepreneurial engagement (Gunia *et al.*, 2021:186; van Gelderen *et al.*, 2018b:489). Similarly, research has even shown that infection with a common parasite (Toxoplasma gondii), which is known to heighten trait impulsivity (Cook, Brenner, Cloninger, Langenberg, Igbide, Giegling, Hartmann, Konte, Friedl & Brundin, 2015:87), can manipulate human behaviour towards venturing, suggesting that factors other than reasoned judgement impact one's engagement in the entrepreneurial process (Lerner *et al.*, 2021:18). Thus, a lack of forethought, reasoning of the consequences, or "impulsiveness" appears to play a key role in the entrepreneurial process (Gunia *et al.*, 2021:181; Hunt & Lerner, 2018:1; Wiklund, 2019:1). Against this backdrop, this thesis-by-publication (TBP), through a series of three papers, explores the role of the ostensibly aberrant, impulsivity traits and their possibility for advancing understanding of entrepreneurial cognition (Grégoire, Corbett & McMullen, 2011:1443), behaviour (Lerner *et al.*, 2018b:52; Wiklund *et al.*, 2018b:3) and behavioural outcomes (Antshel, 2018:243), from a less reasoned perspective.

1.2 RESEARCH PROBLEM

Perhaps one of the most vexing yet important facets of entrepreneurship research arise from precisely pinpointing the most nascent-stage motivations, cognitive processes and actions that ultimately lead to the emergence of new economic ventures (Dimov, 2011:57; Lerner *et al.*, 2018b:66). Although theoretical apprehension of these early-stage motivations has generally assumed the entrepreneur to be a rational and prescient actor, who carefully weighs out the pros and cons of a decision (Miller, 2007:57), recent evidence (refer to Table

1.1) has challenged this fundamental assumption and prompted scholarly re-examination (Lerner *et al.*, 2018b:52; Wiklund, 2019:1). Particularly noteworthy is evidence linking trait impulsivity to entrepreneurial preference (Wiklund *et al.*, 2017:627), and ADHD–a pathology indicated by trait impulsivity–to the likelihood of entrepreneurial venturing (Lerner, Verheul & Thurik, 2019:1), and self-employment (Greidanus & Liao, 2021:1; Wismans *et al.*, 2020:1094). Although this evidence has begun to challenge the fundamental rationality assumption, this work has had a strong empirical focus while lacking theoretical and empirical development of the mechanisms (as exhibited in Table 1.1) underlying the impulsivity-entrepreneurship link (Leung, Franken & Thurik, 2020:2; Wismans *et al.*, 2020:1093). To the extent that theoretically grounded mechanisms explaining the impulsivity-entrepreneurship link from an unreasoned perspective have been lacking, alternate, fully reasoned and rational accounts have proliferated (Brown, Packard & Bylund, 2018:1; Wood, Bakker & Fisher, 2021:147). This proliferation poses the risk of limiting the theoretical and practical relevance of entrepreneurship theory to only that which is clearly positive and rational–thereby dissociating the field from the emerging empirical reality that entrepreneurial (and more generally, human) behaviour and outcomes can also emerge from less reasoned (Hunt & Lerner, 2018:6), more nebulous precursors (Nair *et al.*, 2020:12).

1.3 RESEARCH PURPOSE

The purpose of this TBP is thus to investigate an unreasoned, impulse-driven perspective in entrepreneurship by theorising and testing mechanisms that explain *how* impulsivity impacts three important entrepreneurial outcomes: behaviour (Article 1), the quality of idea pursued (Paper 2), and learning (Paper 3). As outlined below (and in more detail in the papers which follow), these outcomes were identified as particularly fruitful in illuminating how an unreasoned perspective challenges the mainstream theoretical assumption that entrepreneurs follow a reasoned and prescient path (Dimov, 2011:57; Miller, 2007:58). For both nascent and established entrepreneurs looking to engage in the entrepreneurial process[2], action under uncertainty (McMullen & Shepherd, 2006:132), the quality (i.e., commercial prospects) of the idea acted on (Vogel, 2017:943), and ultimately, the ability to learn throughout the process (Wang & Chugh, 2015:11), are vital facets of the highly iterative entrepreneurial journey (McMullen & Dimov, 2013:1481).

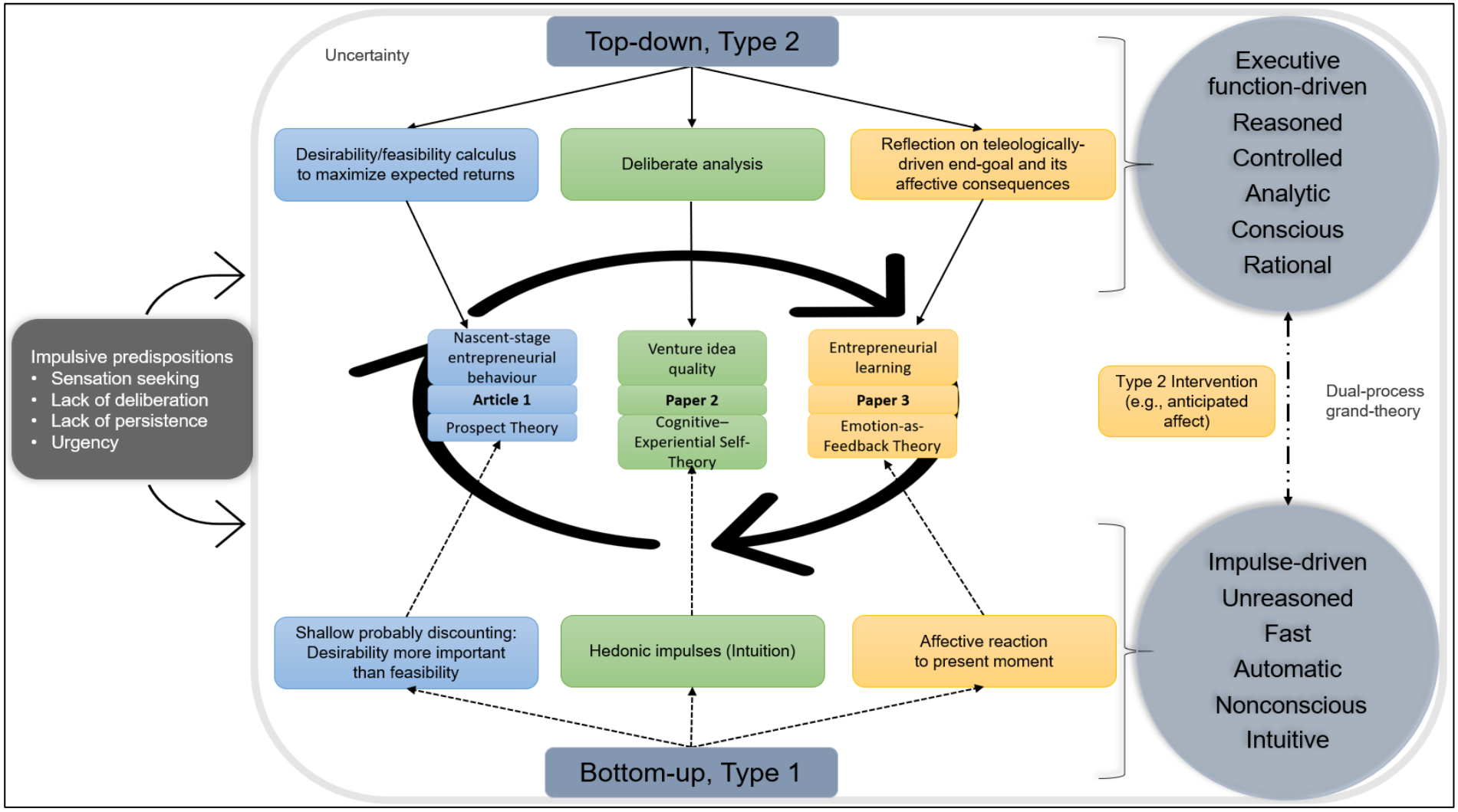
Through the three papers, this TBP attempts to unpack the mechanisms explaining how impulsivity impacts these facets (Illari & Williamson, 2012:119). Mechanisms-based theorising is a way of theorising that argues that "for an explanation to be satisfactory, it must open up the black box and detail the mechanisms that brought about the macro-level outcome to be explained" (Hedström and Wennberg, 2017:94). In so doing, this research provides stronger predictions and a deeper understanding of the phenomena of interest from a reasoning perspective while simultaneously offering insight into how the effects could potentially be ameliorated (Hedström & Ylikoski, 2010:49). By offering theoretically grounded, empirically supported mechanisms underlying the impulsivity-entrepreneurship link, this TBP challenges the mainstream rationality assumption and advances theories of reasoning and rationality in the entrepreneurial context.

As is common in entrepreneurship research, each paper draws from a different theory to best explore the diversity of phenomena investigated (Shepherd, Wennberg, Suddaby & Wiklund, 2019:159). Although there remains no single, unified theory of impulsivity (Sharma, Markon & Clark, 2014:374), there is a general conviction that impulsivity falls within the wider purview of dual-process theories of reasoning (Berg *et al.*, 2015:1129; Evans, 2008:255). Consequently, each theoretical lens employed in this TBP–whether Reinforcement Sensitivity Theory (Gray, 1994:329) and Prospect Theory of judgement under uncertainty (Tversky & Kahneman, 1974:1124; Tversky & Kahneman, 1992:297) in Article 1, Cognitive–Experiential Self-Theory in Paper 2 (Epstein, Pacini, Denes-Raj & Heier, 1996:390), or Emotion-as-feedback theory in Paper 3 (Baumeister, Vohs, Nathan DeWall & Zhang, 2007:167)–has its roots in, and is linked by, Dual-process Theory (Evans, 2008:256). Although these multiple mid-range theories emerge in different forms, all are built on dual-processing as a foundational grand-theory (Saad, 2017:469), which has guided explication of the basic processes underlying reasoning (Hodgkinson & Sadler-Smith, 2018:474-475). Dual-process Theory, consistent with conceptualisations of impulsivity (Berg *et al.*, 2015:1129; Rochat, Billieux, Gagnon & Van der Linden, 2018:45), suggests that when exploring phenomena through a cognitive science lens (Grégoire *et al.*, 2011:1443), it is often useful to distil cognition into dual processing Types. Type 1 processing is more automatic, nonconscious, nondeliberative, and fast; while Type 2 processing is more controlled, conscious, calculative, and slow (Evans, 2008:255). Although there exists some overlap in the characteristics between Type 1 and 2 processing (e.g., unreasoned behaviour

can emerge from both processing Types and is largely epiphenomenal, as explored in Paper 2), these processing Types are ultimately distinguished by their respective direct engagement of, or autonomy from, executive functions (i.e., working memory capacity; Evans & Stanovich, 2013:235). Thus, as a distinction that has been useful in understanding human decision processes generally (Evans, 2008:263) and in the management literature specifically (Hodgkinson & Healey, 2011:1500), this TBP employs a dual-process view as a guiding theoretical framework to arrive at more unified and precise knowledge (Saad, 2017:472) of the role of impulsivity and reasoning in the entrepreneurial context.

Figure 1.1 illustrates the overarching structure of this TBP, how, following the aforementioned theorising, trait impulsivity influences the degree to which the dual processing Types manifest in influencing behaviour, and ultimately how impulsivity, through a lack of reasoning, impacts the three important entrepreneurial outcomes outlined.

Figure1.1: Overarching TBP structure: Investigating mechanisms which explain how impulsivity impacts three important entrepreneurial outcomes



Source: Own compilation.

Article 1 draws from the notion of probability discounting in Prospect Theory of judgement under uncertainty (Tversky & Kahneman, 1974:1124; Tversky & Kahneman, 1992:297) to illustrate that not all individuals engage in conscious feasibility calculus (Type 2), some act entrepreneurially based on basic, bottom-up attraction to the desirability of entrepreneurial opportunities without regard for the consequences. Paper 2 draws from Cognitive–Experiential Self-Theory (Epstein *et al.*, 1996:390) to illustrate that emotion-neutral disinhibition (Type 2) and emotion-driven hedonic impulses (Type 1) are distinct processes explaining the impact of impulsivity on venture idea quality. Paper 3 zooms in on emotion, drawing from Emotion-as-Feedback Theory (Baumeister *et al.*, 2007:167) and the notion of temporal discounting among impulsive individuals (Green & Myerson, 2013:3), to illustrate that affect experienced in the moment (a less reasoned, Type 1 category of affect), and the forecasting of positive affective consequences (a more reasoned Type 2 category; Evans & Stanovich, 2013:233), play distinct roles in impacting entrepreneurial learning and explaining the effect of impulsivity on learning.

1.4 RESEARCH OBJECTIVES

Consistent with the purpose of this TBP–to investigate an unreasoned perspective in entrepreneurship by theorising and testing mechanisms that explain *how* impulsivity impacts three important entrepreneurial outcomes: behaviour, the quality of idea pursued and learning–three central research objectives are outlined, each of which is answered by one of three individual papers:

- Article 1: Explore the extent to which impulsivity affects entrepreneurial behaviour and what mechanism, from a cognitive perspective, explains this effect.
- Paper 2: Given the theorised lack of reasoning and increased entrepreneurial behaviour associated with impulsivity, explore the impact of impulsivity on the quality of first- and third-person venture ideas and the cognitive mechanisms explaining this effect.
- Paper 3: Given impulsive individual's predicted higher level of entrepreneurial behaviour (engagement) and potentially lower levels of idea quality, explore the extent to which impulsivity affects the ability to learn from engagement in this context and the cognitive mechanisms explaining this effect.

1.5 RESEARCH STRUCTURE AND OVERVIEW

Since this thesis is structured using an individual paper-based format, each chapter (Chapters 2-4) is a standalone research output aimed at addressing one of the research objectives. Since each paper functions as a distinct manuscript for a separate journal, there may be some duplication between each chapter (e.g., definitions), as they ought to be fully contained and understood on their own, without relying on each other. Although each paper aims to address one research question comprehensively, all are closely interlinked, mutually informative, and governed by the overarching purpose of the TBP (refer to purpose statement, section 1.3; and overarching TBP structure, Figure 1.1).

As illustrated in Figure 1.1, entrepreneurial behaviour and idea quality are closely interrelated; the willingness to engage in entrepreneurial behaviour under uncertainty impacts idea quality, and idea quality impacts this behavioural willingness (McMullen & Shepherd, 2006:132). However, in a milieu characterised by conditions of change, uncertainty, complexity, and other knowledge problems (Townsend, Hunt, McMullen & Sarasvathy, 2018), entrepreneurs need to be exceptional learners, learning from what works and what does not as they navigate, and adjust, towards the exploitation of a valuable entrepreneurial idea (Harrison & Leitch, 2005). Thus, entrepreneurial learning plays a key overarching role in understanding how entrepreneurs navigate the entrepreneurial process (Aldrich & Yang, 2014:59; Franco & Haase, 2009:628; Politis, 2005:399; Wang & Chugh, 2015:11), which carries broader relevance for entrepreneurial behaviour and the quality of idea ultimately exploited. At the mechanisms level, Article 1 provides a descriptive account of impulsivity through unreasoned entrepreneurial action. Paper 2 broadens understanding of impulsivity beyond a lack of reasoned regard for the consequences to include hedonic impulses as an additional explanatory mechanism for impulsivity which is important when aiming to understand decision efficacy (i.e., venture idea quality). Finally, Paper 3 broadens understanding of impulsivity even further by introducing considerations of temporality and temporal discounting as an additional explanatory mechanism for the impulsivity-entrepreneurship link. Thus, overall, this TBP theoretically and empirically develops an unreasoned, impulse-driven perspective in entrepreneurship by systematically developing explanatory accounts in each paper for how impulsivity impacts three closely interlinked and important entrepreneurial outcomes.

Upon presenting this TBP for examination, each paper had the following publication status: Article 1 (Chapter 2) has been published in the International Small Business Journal (Article DOI: 10.1177/02662426211008149). At the time of publication, this journal displayed the following metrics: A-rated, Social Sciences Citation Index (Clarivate Analytics), Web of Science (Clarivate Analytics) and SCOPUS (Elsevier) accredited with an impact factor of 5.473 and a five-year impact factor of 7.220, a SCImago Journal Rank (SJR) of 26 out of 434 (score: 1.848) and a CiteScore Rank of 15 out of 394 (score: 8.9) journals in the category of Business and International Management (International Small Business Journal: Researching Entrepreneurship, 2021). Paper 2 (Chapter 3) has been submitted to the Strategic Entrepreneurship Journal. At the time of submission, this journal displayed the following metrics: A-rated, Social Sciences Citation Index (Clarivate Analytics), Web of Science (Clarivate Analytics) and SCOPUS (Elsevier) accredited with an impact factor of 9.289, a CiteScore Rank of 14 out of 226 journals in the category of Management (Strategic Entrepreneurship Journal, 2021). Paper 3 (Chapter 4) has been submitted to the Journal of Small Business Management. At the time of submission, this journal displayed the following metrics: A-rated, Social Sciences Citation Index (Clarivate Analytics), Web of Science (Clarivate Analytics) and SCOPUS (Elsevier)accredited with an impact factor of 4.544 and a five-year impact factor of 6.799, a SCImago Journal score (SJR) of 1.683 and a CiteScore of 6.4 (Journal of Small Business Management, 2021).

Below, direct quotes of the abstracts for each paper are presented. Unless remaining unpublished, reference should be made to each specific paper rather than this TBP as a whole. **Article 1 (Chapter 2)** investigates the promising new ground for the theoretical and empirical development of an impulse-driven, unreasoned cognitive pathway to entrepreneurial behaviour. Exploration of this pathway has been invited by work associating impulsivity and related dispositional traits to entrepreneurial behaviour (Lerner *et al.*, 2018b:52).

Article 1 Abstract:

> “While entrepreneurial behaviour is generally seen to arise from a reasoned, judgement-then-action pathway, evidence of an alternative is emerging. Yet, this alternative–an unreasoned, impulse-driven pathway–remains to be empirically explored. We develop a novel measure to capture this unreasoned pathway and

test a mediation model explaining how multidimensional trait impulsivity impacts entrepreneurial behaviour via this pathway. Employing structural equation modelling with prospective survey data from owner-managers and several robustness tests, we find compelling support for our model. We demonstrate a lack of reasoning, exhibited through placing more salience on an entrepreneurial opportunity's desirability than feasibility, as a critical pathway explaining how impulsivity encourages entrepreneurial behaviour and overcomes the inhibitory effects of uncertainty in entrepreneurial pursuits. These results advance a rapidly unfolding scholarly debate regarding whether all entrepreneurial behaviour ought to be ascribed a reasoned, intendedly rational role, the implications of which extend to theories of entrepreneurial behaviour and the inclusion of an unreasoned pathway within them."

By demonstrating how impulsivity drives entrepreneurial action via a lack of reasoning, **Article 1** illustrates how impulsivity may encourage a lack of due diligence and feasibility analysis, facets also vital to pursuing an idea with reasonable commercial prospects (Vogel, 2017:943). Thus, **Paper 2 (Chapter 3)** explores the implications of impulsivity and a lack of reasoning for venture idea quality.

Paper 2 Abstract:

"Despite mainstream understanding of entrepreneurship as a rational undertaking, emerging research suggests trait impulsivity is also an important driver of entrepreneurial pursuits. Yet, knowledge of the quality of these pursuits and the cognitive processes underlying them is lacking. This paper investigates emotion-neutral disinhibition and emotion-driven hedonic impulses as distinct processes explaining impulsivity's impact on venture idea quality. Two studies, a prospective survey and experiment, illuminate these distinct impulsive pathways. The findings advance important implications for understanding the underpinnings of venture idea pursuit by demonstrating that the fundamental ability to pursue high potential ideas requires one to harness both rational and visceral faculties; to blend unemotional analysis with less deliberative, intuitive processes. The implications extend to theories of entrepreneurial and strategic action under ineliminable uncertainty, and the inclusion of distinct reasoning Types within them."

While **Article 1** indicates how certain impulsivity dimensions may impel the initial instigation of entrepreneurial behaviour, and **Paper 2** indicates how impulsivity impacts the development of, and decision to pursue, high quality venture concepts (Shepherd *et al.*, 2019:159; Teague & Gartner, 2017:71); **Paper 3 (Chapter 4)** addresses a central question that arises from these two papers: To what extent does impulsivity impact the ability to learn from engaging in the entrepreneurial journey, and what might be the mechanisms explaining this learning pathway? **Paper 3** continues the investigation through a cognitive science lens, this time investigating the effects of impulsivity on one's learning proficiency in the entrepreneurial context.

Paper 3 Abstract:

> "Entrepreneurial learning has largely been viewed as a reflective process; a process guided by some prescient entrepreneurial goal. Yet, uncertainty inherent in entrepreneurship suggests limitations to this view. Drawing on Emotion-as-Feedback Theory, I investigate a more impulse-driven approach to entrepreneurial learning. Survey data from entrepreneurs (N=584), assessed using latent moderated structural equations, reveals mostly U-shaped indirect effects of multidimensional impulsivity on entrepreneurial learning. I uncover affect experienced in the moment as a mechanism explaining these effects and the forecasting of positive affective consequences–a more reflective category of affect–as a moderator augmenting these effects. Overall, I demonstrate value to this impulse-driven approach, particularly under uncertainty and in terms of predicting venturing performance 12 months later. Unfettered by the uncertainty plaguing more reflective views, this article advances an important alternative to entrepreneurial learning, with broader implications for understanding the role of time in the venturing process."

Collectively, Article 1 and Papers 2 and 3 contribute to the body of knowledge aimed at more precisely pinpointing, from an unreasoned perspective, the motivations, cognitive processes and actions that ultimately lead to the successful emergence of new economic ventures (Dimov, 2011:57; Lerner *et al.*, 2018b:52).

1.6 RESEARCH METHODOLOGY

1.6.1 Research design

A brief outline of the research design is provided here. Since this TBP employs an article-based format to investigate each research objective, the research methodology is distinct for each of the three papers. Thus, the methodology employed in each paper is described in more detail in the chapters which follow. Overall, this TBP takes a critical realist epistemological stance (Bell, Bryman & Harley, 2018:30-31) and accordingly employs a quantitative research design using structured questionnaires (administered over two time periods), and a novel online experiment to address the research objectives. This research design is appropriate for this TBP for three reasons. First, there are well-established and validated measures for constructs, such as impulsivity, entrepreneurial behaviour, entrepreneurial learning and idea quality (refer to individual papers). Second, most empirical research on this TBP's topic has employed a quantitative design, using regression-based approaches, including structural equation modelling to test hypotheses (Geenen, Urbig, Muehlfeld, van Witteloostuijn & Gargalianou, 2016:24; Verheul *et al.*, 2015:85; Wiklund *et al.*, 2017:627). Finally, the majority of theory development (or conceptual) papers in this domain (Antshel, 2018:243; Lerner, Hunt & Verheul, 2018c:266; Wiklund, Hatak, Patzelt & Shepherd, 2018a:182; Wiklund *et al.*, 2016:14; Wiklund *et al.*, 2018b:1) take a critical realist epistemological stance (Bell *et al.*, 2018:30-31), which is consistent with the stance and design of this TBP. Throughout, attempts are made to triangulate the results by incorporating prospective designs (Spector, 2019:125), robustness tests, and experimental validation. These triangulation efforts allowed for greater insight into the time ordering of variables strengthened the ability to make causal inferences, and increased confidence in the findings (Bell *et al.*, 2018:574-575; Davidsson & Gordon, 2012:853; Onwuegbuzie & Collins, 2007:281).

1.6.2 Data collection

All data were collected online using Qualtrics. The prospective survey comprised two questionnaire waves administered 12 months apart. Each wave was distributed via email with two bi-weekly reminders to potential respondents. The potential respondents were drawn from a national stratified random sampling frame of 20 000 owner-managers, where sampling frame refers to the list of individuals in a population which can feasibly be selected for inclusion in the sample (Bell *et al.*, 2018:188). The online experiment was distributed via

the Amazon Mechanical Turk (MTurk) platform. Article 1 and Papers 2 and 3 relied on data from both the first questionnaire (wave 1) and the second questionnaire (wave 2), while Paper 2 also relied on the experimental data. Below, a brief overview of the measures employed in each instrument is provided.

1.6.2.1 *Wave 1 questionnaire*

Measures captured at wave 1 included:

- The Urgency, Premeditation, Perseverance and Sensation seeking (UPPS) Impulsive Behaviour Scale, developed by Whiteside and Lynam (2001:669-689) (refer to question 1, Appendix B p. 211).
- The Positive and Negative Affect Scale (PANAS) by Watson, Clark and Tellegen (1988:1070) (refer to question 2, Appendix B p. 211).
- The importance put on desirability versus feasibility developed by the author of this TBP (refer to question 4-6, Appendix B p. 211).
- Entrepreneurial Behaviour Expectations, captured by adjusting the scale by Kolvereid and Isaksen (2006:866) (refer to question 7, Appendix B p. 211).
- Entrepreneurial learning, captured by adapting the strategic learning capability scale by Anderson, Covin and Slevin (2009:236) (see question 14, Appendix B p. 211).
- A range of demographic variables, including industry background, gender, age, education level, the provincial location of their primary business, and when they founded their primary business (see questions 10-15 in Appendix B, p. 211).

1.6.2.2 *Wave 2 questionnaire*

Measures captured at wave 2 included:

- The Rational-Experiential Inventory (REI-24) by Pacini and Epstein (1999:972) (refer to question 4, Appendix C p.214).
- Venture idea quality, captured by adopting the measure from Baron and Ensley (2006:1331) (refer to question 2, Appendix C p.214).
- Venture-level financial indicators of performance are measured by adapting the original scale by Wiklund and Shepherd (2003:1307) and used in subsequent research (Anderson, Eshima & Hornsby, 2018; Auh & Menguc, 2005:1652; Eshima

& Anderson, 2017:770; Powell & Eddleston, 2013:261) (refer to question 6, Appendix C p.214).

- Entrepreneurial action, captured by combining the scales by Kautonen, van Gelderen and Fink (2015:655) and van Gelderen, Kautonen, Wincent and Biniari (2018a:923) (refer to question 2-3, Appendix C p.214).
- Uncertainty, captured using the scale by Green, Covin and Slevin (2008:356) (refer to question 9, Appendix C p.214). This scale conceptualises uncertainty as the respondent's perceived lack of certainty or predictability regarding the environment and possible future outcomes (Milliken, 1987:133), caused by the dynamism of the environment faced by the venture (Dess & Beard, 1984:52).
- Entrepreneurial experience, measured by combining the scales by Zhao, Seibert and Hills (2005:1265) and Zhao, Song and Storm (2013:789) (refer to question 8, Appendix C p.214).
- A range of additional control variables, including (a) a measure of engagement in exploration and exploitation activities using the validated 16-item scale by Keller and Weibler (2015:54), (b) a measure of decision-making decentralisation adapted from Germain (1996:117) and Foss, Lyngsie and Zahra (2013:1453), (c) social desirability bias (Fischer & Fick, 1993:417), (d) environmental hostility by (Green *et al.*, 2008:356), (e) number of full-time employees, (f) percentage of sales generated from new products/services, and (g) the total number of new business opportunities the respondent (i) has successfully realised, and (ii) has attempted, but failed to commercialise in the last three years (see questions 1, 5 and 10-11 in Appendix C, p.214).

1.6.2.3 *Experiment*

The novel experiment comprised two data sources. First, an idea generating task was administered to experiment participants and included the following manipulations and measures:

- Hedonic impulses and analysis primed using the approach of Hsee and Rottenstreich (2004) (Appendix D, Screen 2, QI2-QI6 and QA2-QA6).
- Disinhibition, following Cone and Rand (2014:1-13); Rand, Greene and Nowak (2012:427), manipulated using a time constraint condition (Appendix D, Screen 3-

time pressure condition and Screen 4-time pressure condition). Given that the above disinhibition manipulation could threaten ecological validity (c.f., Chapter 3, Paper 2, section 6.2), an alternative disinhibition manipulation (van den Bos, Müller & van Bussel, 2009:873) was also employed (Appendix D, Screen 2, QD2-QD4). However, manipulation checks revealed it was not effective and was thus excluded from further analysis.

- A priming manipulation check captured using an adapted version of the REI-24 (Epstein *et al.*, 1996:1939).
- An idea generating task (Frederiks, Englis, Ehrenhard & Groen, 2019:327) (Appendix D, Screen 3, Q7).
- Participants' likelihood of entrepreneurial action based on their idea, using an action likelihood measure by Wood, Williams and Drover (2017:107) (Appendix D, Screen 3, Q8).
- An idea elaboration task using 11 clarification questions from Osterwalder and Pigneur's (2010:46) business model canvas following Frederiks *et al.* (2019:327) (Appendix D, Screen 4, Q9-19).

Second, an independent, expert-rater task was administered to more objectively capture idea quality:

- The 15-item (5 items per dimension), 7-point Likert-type scale adapted from Baron and Ensley's (2006:1331) captured raters' assessment of the three dimensions of idea quality (Appendix E, Q2).
- A newly developed and extensively validated, 4-item scale by Davidsson, Grégoire and Lex (2021:1-23), as an additional measure capturing 'venture idea assessment', or the level of confidence, versus uncertainty, the rater has in the venture concept.

1.6.3 Data analysis methods

Data analysis was conducted by the author using a variety of statistical methods. As illustrated in Table 1.2, all papers employed structural equation modelling methods to test the hypotheses since this method accounts for measurement error while facilitating the testing and comparison of multiple, complex theoretical models (Kline, 2016). In addition, the ubiquitous threat of endogeneity was continually addressed through a variety of

techniques, including the incorporation of instrumental variables (IVs), prospective design, triangulation with experimental data, triangulation with alternative measures of constructs, and assessment of alternative explanations for the data (Anderson, Wennberg & McMullen, 2019:1-11; Antonakis, Bendahan, Jacquart & Lalive, 2010:1086). A brief outline of the methods used for each paper is outlined next.

1.6.3.1 *Article 1 analysis*

Article 1 employed the lavaan package (version 0.6-5) (Rosseel, 2012:1) to perform covariance-based structural equation modelling (CB-SEM) using the Maximum Likelihood method. Multi-group analyses were performed to assess the robustness of the theorised model to variations in a range of demographic factors. To avoid assumptions regarding normality, all indirect effects were estimated using 5000 bootstrap re-samples and a 95% bias-corrected confidence interval (MacKinnon, Lockwood, Hoffman, West & Sheets, 2002:83).

1.6.3.2 *Paper 2 analysis*

Paper 2 comprised two studies, each with separate analyses. Since Paper 2 required estimation of interaction effects, Mplus (version 8.4) was used in study 1 to estimate latent moderated structural equations (LMS) (Klein & Moosbrugger, 2000). Study 2 comprised a novel experimental design which was analysed using one-way between-subjects analyses of variance (ANOVA) and linear regression tests to compare the various manipulated conditions.

1.6.3.3 *Paper 3 analysis*

Since Paper 3 hypothesised a variety of quadratic and interaction effects, LMS was again employed in Mplus. The LMS approach does not require the creation of product indicators, rather using the raw data from indicator variables directly in its expectation maximisation (EM) estimation (Klein & Moosbrugger, 2000). Thus, LMS enables more precise estimation of latent quadratic and interaction effects than traditional product-indicator approaches due to its explicit estimation of nonnormality inherent in nonlinear terms (Moosbrugger, Schermelleh-Engel, Kelava & Klein, 2009:103).

1.7 RESEARCH ETHICS

This TBP followed best practice recommendations by Cooper and Schindler (2014), and the Faculty of Economic and Management Sciences at the University of Pretoria to uphold ethical standards. Dedicated efforts were made towards maintaining an objective and unbiased interpretation of the data through careful and critical judgement. In addition, each respondent for each research instrument had to read the informed consent forms (see Appendices B-E, p. 211-242) and agree to the terms thereof prior to participating in the studies. The forms describe each study's purpose, emphasise respondents' voluntary participation and freedom to withdraw at any time, and assure anonymity and confidentiality. Thus, respondents' identifying information, including names, were not requested or included in the data sets. All results were calculated and reported at the aggregate level rather than the individual level–thereby ensuring that the purpose of this TBP was met while avoiding any potential negative implications against specific subjects and/or their businesses. Finally, the implications of the findings of each paper were considered carefully to understand the potential impact thereof on the community of entrepreneurs and individuals exhibiting heightened predispositions towards ADHD and impulsivity. It is acknowledged that there is a multitude of factors affecting desired entrepreneurial outcomes, and therefore, a balanced outlook on any ostensibly beneficial or harmful relationships was continuously sought.

Each study applied for and obtained ethical clearance from the Research Ethics Committee of the Faculty of Economic and Management Sciences at the University of Pretoria. Related research instruments and documentation are included in Appendices A to H:

- Appendix A contains the Turnitin originality reports for each chapter and paper.
- Appendix B contains the ethical clearance approval certificates.
- Appendices C-F contain the final, pre-tested research instruments and associated informed consent forms used to collect data.
- Appendices G and H contain supplementary material for Article 1 and Paper 2, respectively.

1.8 REFERENCING TECHNIQUE

Chapters 1 and 5 followed the referencing guidelines outlined in the *"Referencing in academic documents,"* 7th edition 2016, by Theuns Kotzé as the official referencing guidelines of the Department of Business Management at the University of Pretoria, which is a revision of the Harvard referencing style. In Chapters 2-4, the referencing style differs based on the specific requirements of the targeted journal.

1.9 ARRANGEMENT OF CHAPTERS AND STUDY PERIOD

Table 1.2 indicates the chapter structure of this TBP, and the primary research method used for each chapter.

Table 1.2: Chapter structure and primary research method

Chapter	Subject	Method	Journal	Status	Journal Quality (Australian Business Deans Council, 2019)	Journal impact factor (Web of Science, 2020)	Accreditation
1	Thesis introduction, research problem, paper structure, and the methods applied	Introduction problematisation, purpose, and methods	-	-	-	-	-
2	**Article 1–**Impulsivity and entrepreneurial behaviour: Exploring an unreasoned pathway	Prospective design, covariance-based structural equation modelling, multi-group analyses, endogeneity tests	International Small Business Journal	Published	A-rated	5.473	Social Sciences Citation Index (Clarivate Analytics), Web of Science (Clarivate Analytics) and SCOPUS (Elsevier) accredited (International Small Business Journal: Researching Entrepreneurship, 2021).
3	**Paper 2–**Suitably irrational? a dual processing account of impulsivity in the pursuit of high-quality venture ideas	Prospective design, latent-moderated structural equation modelling, interaction effects	Strategic Entrepreneurship Journal	Submitted	A-rated	9.289	Social Sciences Citation Index (Clarivate Analytics), Web of Science (Clarivate Analytics) and SCOPUS (Elsevier) accredited (Strategic Entrepreneurship Journal, 2021).
4	**Paper 3–**Reflective versus impulse-driven approaches to entrepreneurial learning: Exploring a pathway unfettered by uncertainty	Latent-moderated structural equation modelling, curvilinear effects, interaction effects, prospective component and endogeneity tests	Journal of Small Business Management	Submitted	A-rated	4.544	Social Sciences Citation Index (Clarivate Analytics), Web of Science (Clarivate Analytics) and SCOPUS (Elsevier) accredited (Journal of Small Business Management, 2021).
5	Summary of the main findings of this TBP and concluding remarks	Summary of findings, implications, and concluding remarks	-	-	-	-	-

To achieve the objectives of this TBP, three papers on the role of impulsivity in the entrepreneurial context are presented. Each paper successively builds on the next, and each interlinks to provide a more comprehensive picture of the implications of impulsivity and a lack of reasoning in the entrepreneurial context. Starting from the initial instigation of entrepreneurial behaviour to the quality of idea pursued, and, finally, learning in the entrepreneurial process, insight is generated into key outcomes emerging from impulsivity, which contributes to the body of knowledge. First, an introduction and description of the research problem have been presented along with an introductory review of the literature, problematisation of the field, and a demonstration of the links between the three papers in Chapter 1. Second, emerging from this problematisation, Chapter 2 (Article 1) proposes a model explaining how, from a cognitive perspective, impulsivity may drive entrepreneurial action via a lack of reasoning and has implications for theories of entrepreneurial cognition and behaviour. Third, building on, and continuing with the cognitive perspective of Article 1, Chapter 3 (Paper 2), explores how impulsivity affects the quality of idea one formulates and pursues through the dual, largely orthogonal reasoning processes. Fourth, following the proposed theoretical and practical implications of these papers, Chapter 4 (Paper 3) investigates how impulsivity impacts one's proficiency at learning from feedback in the entrepreneurial context through various forms of emotion as explanatory mechanisms. Finally, Chapter 5 discusses the empirical findings, draws overarching implications for theory and practice, and concludes the thesis.

1.10 NOTES TO READERS

There may be some duplication in Chapters 2-4, as each Chapter ought to be interlinked and governed by the overarching purpose of this TBP while still being fully contained and understood independent of the other chapters (refer to purpose statement, section 1.3; and overarching TBP structure, Figure 1.1). Where indicated in the chapters, supplementary material is provided to enable the reader to get a deeper insight into analyses performed. Article 1 (Chapter 2) is referred to as an article while the other manuscripts are referred to as papers since Article 1 has been successfully published. In cases where Article 1 is referenced in other chapters, a full journal reference is provided. The full TBP has been processed through Turnitin to ensure originality. Although all chapters employ uniform formatting (e.g., font and line spacing), language (e.g., U.K vs U.S English, active and passive voice) and referencing style differ as per the requirements of each specific journal.

In particular it is important to note that while Chapters 1 and 5 employ third-person language, Chapters 2-4 use more active, first-person language to meet the requirements of the journals. Following the policy on co-authorship with postgraduate students in the Faculty of Economic and Management Sciences (August 2018), the supervisor is a co-author on the first article of this TBP as reciprocity for the supervisory role performed. In this first article, the use of plural personal pronouns such as “we” and “our” refers to the student’s own work while acknowledging the guidance and support the supervisor has dedicated to the student’s research.

1.11 ENDNOTES

[1]It is important to note that some scholars have attempted to define unreasoned entrepreneurial action as reasoned and rational by arguing that unreasoned behaviour is ultimately driven by what can be argued as some intendedly-rational goal (Wood et al., 2020:147; Brown et al., 2018:1). Notwithstanding the argument that there is limited practical and scientific utility in defining unreasoned action as rational (Wiklund, 2019:2), this TBP takes the predominant scholarly stance in psychology generally (Hofmann et al., 2009:162) and in entrepreneurship specifically (Lerner et al., 2018:55; Hunt and Lerner, 2018:3), in denoting action without regard to the consequences as unreasoned. [Refer to Article 1 for a more detailed discussion on these conceptual debates.]

[2]Since the phenomena investigated in this TBP exert a significant effect on how the entrepreneurial process unfolds, reference is made to this process to illustrate the broader relevance of the investigation. This TBP does not specifically investigate the entrepreneurial process in terms of how phenomena change and unfold over time, and this is a fruitful line of future inquiry.

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CHAPTER 2 (ARTICLE 1):

IMPULSIVITY AND ENTREPRENEURIAL BEHAVIOUR: EXPLORING AN UNREASONED PATHWAY

Chapter 2 presents Article 1. This article develops a mechanism explaining *how* impulsivity affects entrepreneurial behaviour (i.e., action). This Article is published in the International Small Business Journal (Article DOI: 10.1177/02662426211008149).

2 **ABSTRACT***While entrepreneurial behaviour is generally seen to arise from a reasoned, judgement-then-action pathway, evidence of an alternative is emerging. Yet, this alternative–an unreasoned, impulse-driven pathway–remains to be empirically explored. We develop a novel measure to capture this unreasoned pathway and test a mediation model explaining how multidimensional trait impulsivity impacts entrepreneurial behaviour via this pathway. Employing structural equation modelling with longitudinal survey data from owner-managers and several robustness tests, we find compelling support for our model. We demonstrate a lack of reasoning, exhibited through placing more salience on an entrepreneurial opportunity's desirability than feasibility, as a critical pathway explaining how impulsivity encourages entrepreneurial behaviour and overcomes the inhibitory effects of uncertainty in entrepreneurial pursuits. These results advance a rapidly unfolding scholarly debate regarding whether all entrepreneurial behaviour ought to be ascribed a reasoned, intendedly-rational role; the implications of which extend to theories of entrepreneurial behaviour and the inclusion of an unreasoned pathway within them.*

Keywords: Impulsivity, unreasoned pathway, judgement-then-action pathway, entrepreneurial behaviour, probability discounting

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2.1 INTRODUCTION

Without the pursuit of entrepreneurial opportunities, new economic ventures would simply not emerge (Townsend, Hunt, McMullen et al., 2018). Thus, a key question for entrepreneurship scholars is why some individuals act decisively, vigorously, and often, repeatedly towards entrepreneurial opportunities, while others are hesitant and suffer from inaction in the face of uncertainty. With few exceptions, models aimed at explaining this phenomenon implicitly assume a rational, judgement-then-action pathway, where some form of evaluative, "cost-benefit calculus" of both opportunity desirability and feasibility undergirds entrepreneurial behaviour (McMullen and Shepherd, 2006; Schlaegel and Koenig, 2014). Yet, recent work poses an interesting counterpoint to this extensive research by suggesting that while a large portion of entrepreneurial behaviour indeed occurs through intendedly-rational pathways, a substantive portion may also occur without *ex-ante* reasoning (Kautonen, van Gelderen and Fink, 2015).

Perhaps the most prominent development in this regard is emerging research linking Attention Deficit/Hyperactivity Disorder (ADHD) to higher entrepreneurial intention (EI) (Verheul, Block, Burmeister-Lamp et al., 2015), entrepreneurial orientation (Wismans, Thurik, Verheul et al., 2020), and nascent venturing (Lerner, Verheul and Thurik, 2019; Stappers and Andries, 2021); where impulsivity appears to be the underlying trait driving these results (Antshel, 2018; Wiklund, Yu, Tucker et al., 2017). Impulsivity is a multidimensional construct encompassing four distinct impulsigenic traits, which predispose individuals to impulsive behaviours (Whiteside and Lynam, 2001). These impulsive behaviours reflect rapid reactions to internal or external stimuli without forethought, reasoning, or deliberation of the consequences of those reactions (Moeller, Barratt, Dougherty et al., 2001). Hence, scholars have suggested that research positively linking impulsivity to EI, and entrepreneurial behaviour indicates an unreasoned pathway (Hunt and Lerner, 2018; Wiklund, 2019), which begins to support a broader spectrum view of entrepreneurial behaviour propounded by Lerner, Hunt and Dimov (2018b). This view acknowledges the indisputable role of the judgement-then-action pathway, yet also recognises the presence of an unreasoned pathway.

However, this emerging empirical work fails to account for *how* impulsivity may impel entrepreneurial behaviour from an unreasoned perspective. In fact, this research simply shows that impulsivity–which represents a *predisposition* towards impulsive behaviours that may or may not manifest, depending on the context (Berg, Latzma, Bliwise et al., 2015)–is related to EI and entrepreneurial behaviour. We suggest this is a crucial limitation that has fostered alternative, fully rational explanations for the impulsivity-entrepreneurial behaviour link and in so doing, has encouraged critiques that impulsivity and unreasoned entrepreneurial behaviour ought to be subsumed within the judgement-then-action perspective (Brown, Packard and Bylund, 2018). For example, research demonstrating a trait impulsivity-entrepreneurship relationship (e.g., Wiklund et al., 2017) could be explained through the rational formation of conscious vocational plans (EI) towards an entrepreneurial career based on personality-environment fit analyses (Antshel, 2018). Yet advances in psychology (Deutsch and Strack, 2010), neuroscience (de Holan, 2014), and entrepreneurship (Lerner, Alkærsig, Fitza et al., 2021) suggest that such an explanation is overly restrictive: not all human behaviour is reasoned, and some behaviours can, and do, emerge from less reasoned precursors. From a scholarly perspective, these advances

indicate that unreasoned behavioural pathways should be explored to avoid circumscribing entrepreneurship theory to a deliberate, judgement-then-action perspective that may dissociate it from reality (Kitching and Rouse, 2020; Lerner et al., 2018b).

We thus examine an unreasoned pathway by theorising and testing a model exploring the salience placed on the desirability, versus the feasibility, of an entrepreneurial opportunity as a mediator of the trait impulsivity-entrepreneurial behaviour relationship. According to the Prospect Theory (Tversky and Kahneman, 1974) a lack of reasoning directly deviates from judgement-then-action models and is reflected in individuals inadequately accounting for the feasibility of their conduct prior to acting. Rather than being driven by slow, effortful, and consciously controlled forethought, this unreasoned pathway is driven by the more rapid, automatic, and implicit reactions to rewarding versus threatening stimuli underlying trait impulsivity (Carver, 2005; Evans, 2008). Hence, we posit that this relatively newly explored construct is a key mechanism explaining how impulsivity drives unreasoned entrepreneurial behaviour. We tested our model using entrepreneurial behaviour expectations (EBE) as a behavioural predictor, which avoids assumptions of reasoned-intentionality inherent to the concept of EI (Lerner et al., 2018b). While EI reflects a consciously formulated plan to perform a given behaviour (Ajzen, 2011), EBE reflects a self-predicted behavioural likelihood that can be determined regardless of one's deliberately reasoned intent (Warshaw and Davis, 1985). Accordingly, expectations have been empirically demonstrated to more accurately predict unreasoned behaviours (Gibbons, Gerrard, Reimer et al., 2006; Warshaw and Davis, 1985). We specifically operationalise EBE as an expectation regarding the future exploitation of an entrepreneurial opportunity–employing Shane and Venkataraman's (2000) definition of opportunities as "situations in which new goods, services, raw materials, and organising processes can be introduced and sold at greater than their cost of production."

To examine our model, we utilise two waves of survey data from owner-managers–a sample that limits the risk of any observed effects being an artefact of more impulsive individuals being pushed out of traditional employment and into entrepreneurship. The first wave (n=807) tested our theorised model. The second wave (n=221), administered 12 months later, assessed the predictive validity of our model in terms of actual entrepreneurial behaviour undertaken. Drawing on the combined insights of Reinforcement Sensitivity Theory (Gray, 1994), and Prospect Theory (Tversky and Kahneman, 1992) to develop our

model, we advance three noteworthy contributions. First, previous work positively associating impulsivity with EI has been questioned as simply reflecting desire and not true behavioural likelihood (Antshel, 2018), particularly due to the poor conceptual overlap between impulsivity and the deliberate, reasoned-intentionality of EI (Ajzen, 2011; Lerner et al., 2018b). We shift the focus from EI to EBE and demonstrate the validity of EBE in terms of predicting actual entrepreneurial behaviour 12 months later. In so doing, we offer compelling evidence that impulsivity has an important impact on the early stages of the entrepreneurial process, extending beyond superficial desires to elicit a differential behavioural response under uncertainty.

Second, we reveal an underlying mechanism explaining how impulsivity impels entrepreneurial behaviour via a less reasoned pathway. While not eschewing the mainstream judgement-then-action view that has garnered widespread empirical support (Kautonen et al., 2015), this article suggests a less reasoned pathway can also occur, supporting a spectrum of behaviour, from unreasoned to intendedly-rational (Lerner et al., 2018b). By uncovering this pathway and demonstrating how a lack of reasoning deviates from the incumbent judgement-then-action theories of entrepreneurial behaviour (McMullen and Shepherd, 2006) we infuse much-needed empirical weight into an important debate regarding whether *all* entrepreneurial behaviour ought to be ascribed an intendedly-rational role (Brown et al., 2018; Hunt and Lerner, 2018; van Lent, Hunt and Lerner 2021; Wiklund, 2019). Finally, although empirically elusive (Lerner et al., 2018b) we develop and validate a measure in an attempt to capture unreasoned entrepreneurial behaviour. By grounding this measure in understanding how, specifically, unreasoned behaviour deviates from current judgement-then-action theorising (Tversky and Kahneman, 1974) we present a promising attempt at directly incorporating an unreasoned pathway in empirical work on entrepreneurial behaviour, which may further assist in paving the way towards empirical explorations of a variety of unreasoned precursors to entrepreneurial behaviour beyond trait impulsivity.

2.2 THEORETICAL FOUNDATION

2.2.1 Impulsivity within the entrepreneurial action literature

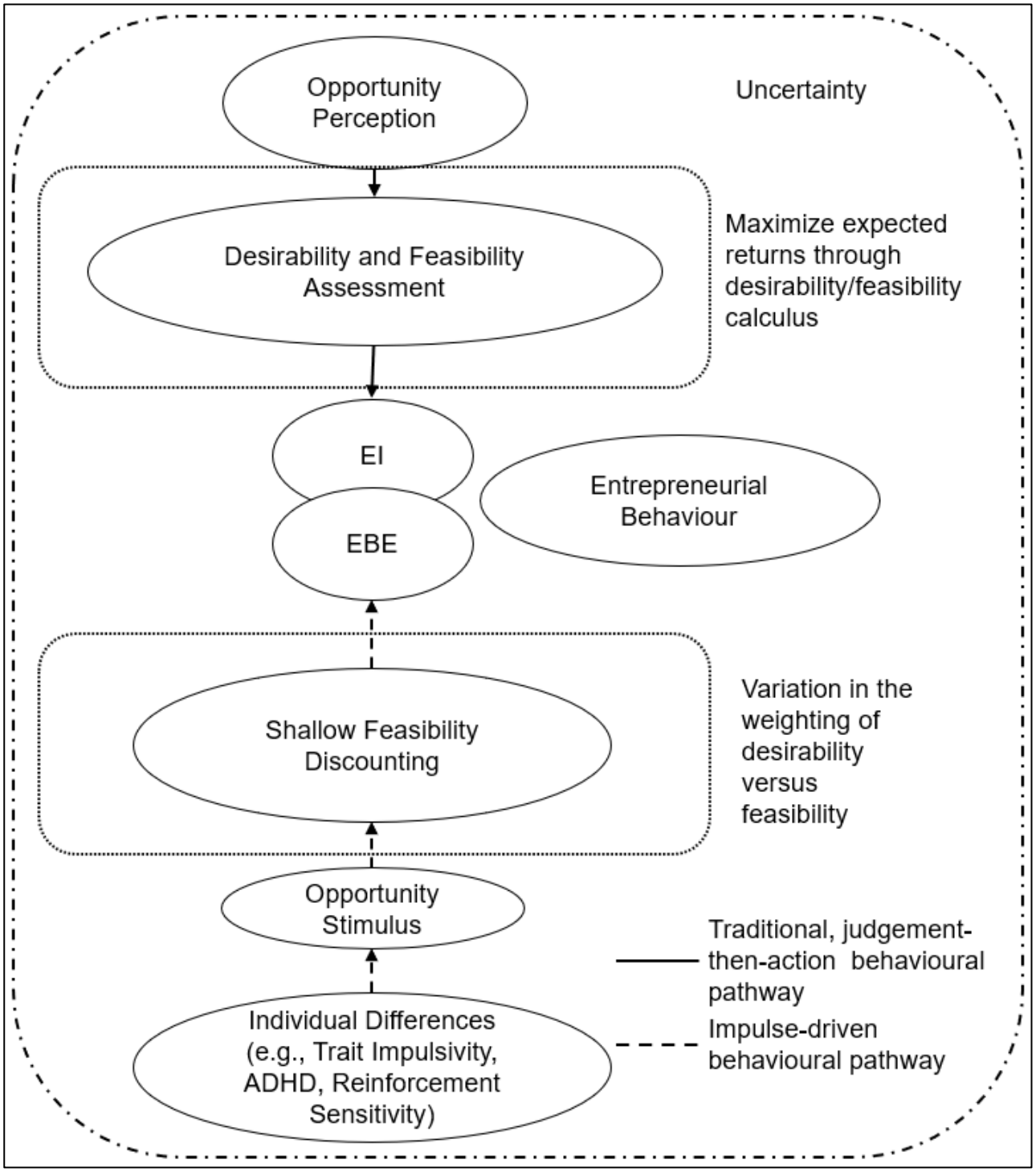
In their seminal work, McMullen and Shepherd (2006:134) define entrepreneurial action as: "behavior in **response to a judgmental decision** under uncertainty about a possible opportunity for profit" (emphasis added). This judgement-then-action perspective has dominated incumbent models of entrepreneurial behaviour (Krueger, 1993; McMullen and Shepherd, 2006), which have, explicitly or implicitly, derived from Expected Utility Theory (Von Neumann and Morgenstern, 1947) to assume that entrepreneurs rationally engage in systematic calculations of opportunity desirability (utility), weighted against feasibility (expectancy), prior to choosing whether to act (Schlaegel and Koenig, 2014). However, emerging research indicates the relevance of impulsivity (Wiklund et al., 2017), and related dispositional factors, such as ADHD (Stappers and Andries, 2021), to explaining entrepreneurial behaviour. While this empirical work suggests the presence of unreasoned entrepreneurial behaviour and descriptive shortcomings of the incumbent models, the lack of a demonstrable mechanism explaining how unreasoned behaviour deviates from these models has fostered alternative, fully rational explanations for the impulsivity-entrepreneurship link. If we are to accept the presence of unreasoned entrepreneurial behaviours, a central challenge is to demonstrate how this behavioural pathway deviates from the judgement-then-action perspective. We, therefore, draw from Prospect Theory (PT) (Tversky and Kahneman, 1974; Tversky and Kahneman, 1992), which, having similarly grappled with the descriptive shortcomings of normative economic theory, has largely been at the centre of efforts to account for how and why individuals deviate from the rationality assumption of expected utility.

While scholars have attempted to subsume unreasoned entrepreneurial behaviour within the judgement view by proposing that the behaviour is actually embedded within some rationally-derived intent (Wood, Bakker and Fisher, 2020; Brown et al., 2018), PT suggests that whether intended or not, unreasoned behaviour is ultimately observed through a disregard for the feasibility of a decision prior to acting (Evans, 2008). We thus adopt the view that while unreasoned entrepreneurial behaviour can arise from some impulsive purpose (e.g., attraction to a desirable opportunity stimulus) (Hofmann, Friese and Strack, 2009; Lerner et al., 2018b) an individual is less likely to consciously plan to act (i.e., form EI) while disregarding the consequences (Warshaw and Davis 1985). Rather, such unreasoned

behaviour tends to be more unconscious and non-volitional in the sense that the behaviour is not governed by effortful deliberation that taxes executive functions and requires the explicit endorsement of a goal and the means for achieving it (Evans, 2008; Hofmann et al., 2009).

To overcome these predictive limitations of EI as a reasoned plan, we employ EBE as a behavioural prediction. While cognitively similar, expectations are formed based on additional personal (e.g., impulsive tendencies), and environmental (e.g., the possibility of being exposed to a novel opportunity stimulus), determinants of behaviour that are not under full volitional control (Warshaw and Davis 1985). By incorporating these determinants, research has shown that expectations allow one to consider their limitations in impulse-control, leading to more accurate prediction of unreasoned behaviours (Carrera, Caballero and Munoz, 2012; Gibbons et al., 2006). The distinctive predictions of expectations is best illustrated with an example: an individual may strongly intend (plan) to avoid drinking alcohol on his way home from work, but may adjust his expectations to recognize his prior inability to drive past the bar without stopping for an alcoholic beverage (Warshaw and Davis 1985). Extended to the entrepreneurial domain, impulsive individuals may not deliberately intend to engage in entrepreneurial behaviour (especially when unreasoned and impractical), yet nonetheless may recognise their likelihood of doing so, given prior experience and environmental cues. As illustrated in Figure 2.1, we thus theorise an unreasoned pathway that deviates from the desirability/feasibility calculus of incumbent models by less heavily weighting (i.e., discounting) the feasibility of an opportunity stimulus prior to forming EBE and engaging in entrepreneurial behaviour.

Figure 2.1: Theorised reasoned versus unreasoned pathways to entrepreneurial behaviour



Note: Figure 2.1 closely aligns with Lerner et al. (2018b), who conceptualise impulse-driven entrepreneurial behaviour as emerging from more basic, bottom-up reactions to an opportunity stimulus without prior forethought rather than from the higher order, consciously held goals of more reasoned behaviour.

Not only does the notion of shallow feasibility discounting in PT provide a formal and robust basis for illustrating a deviation from rationality (Sanfey, Loewenstein, McClure et al., 2006), it also aligns with what is, at its core, considered impulsive behaviour in the psychology literature: action based on desires as opposed to the feasibility of one's conduct (Hofmann

et al., 2009). We employ among the most widely supported (Berg et al., 2015; Sharma, Markon and Clark, 2014), multidimensional conceptualisations of trait impulsivity; Whiteside and Lynam's (2001) four-factor model. This model identifies four heterogeneous aetiologies of "impulsive-like behaviours," including: sensation seeking, lack of premeditation, lack of perseverance, and urgency. (1) Sensation seeking is a proclivity for enjoying, being attracted to, and pursuing exciting, new, and potentially risky experiences; (2) lack of premeditation entails limited deliberation and a disregard for the consequences of one's actions; (3) lack of perseverance is an inability to ignore distracting stimuli and concentrate on uninteresting or tedious activities; and (4) urgency is a proclivity for experiencing intense negative affect (e.g., anxiety, fear) and acting to relieve that affect, despite the possible consequences (Whiteside and Lynam, 2001).

Thus, trait impulsivity is an "umbrella concept" that rather than generating a unified theory of impulsive behaviour, seeks to explain the diversity of contextually-dependent[1] pathways to these behaviours (Antshel, 2018; Berg et al., 2015). Nevertheless, according to Gray's (1994) Reinforcement Sensitivity Theory (RST), a large portion of impulsive behaviour emerging from trait impulsivity can be ascribed to basic, bottom-up neurological differences in sensitivity to reward versus threat (Carver, 2005; Sharma et al., 2014). RST thus offers a parsimonious lens for theorising how trait impulsivity affects behaviour through basic neurological reactions (i.e., unconsciously rather than through higher-order goals), while also closely overlapping with the desirability/feasibility weighting of PT (Hall, Chong, McNaughton et al., 2011; Sanfey et al., 2006). At this "neuroeconomic" intersection (Sanfey et al., 2006) we expand on our core hypotheses–how basic differences in neurological reactivity to threat and reward among the impulsivity dimensions drive unreasoned behaviour through shallow feasibility discounting. However, we commence the development of our model by first expanding on the direct impulsivity-EBE link through opportunity uncertainty as a stimulus.

2.3 HYPOTHESIS DEVELOPMENT

2.3.1 Uncertainty, impulsivity, and Entrepreneurial Behaviour Expectations (EBE)

When forming EBE, immediate affective reactions (e.g., fear, doubt, and aversion) are elicited (Carrera et al., 2012), and uncertainty regarding when, how and whether to engage in entrepreneurial behaviour becomes an important decision input that typically inhibits

behaviour (van Gelderen, Kautonen and Fink, 2015). However, PT suggests this may differ for individuals higher on certain impulsivity traits (Tversky and Kahneman 1974). While the entrepreneurial action literature holds the inhibitory assumption constant between individuals (McMullen and Shepherd, 2006), PT suggests that individuals vary directly in how they frame a decision problem, with some framing novel and uncertain prospects as attractive and exciting (thereby increasing action-likelihood) rather than dangerous and anxiety-provoking (Trepel, Fox and Poldrack, 2005). Impulsive individuals, in particular, may be attracted to uncertainty, actually forging ahead and being more decisive in these contexts (Hofmann et al., 2009). Indeed, research suggests that far from being an obstacle, uncertainty can be a major stimulus driving risky behaviour engagement among impulsive individuals (Leland, Arce, Feinstein et al., 2006), such as engagement in entrepreneurial pursuits (Wiklund et al., 2017).

Considering the distinct impulsivity dimensions, entrepreneurship research has shown particular interest in sensation seeking since, it directly reflects an attraction to engaging in uncertain and novel activities (Wiklund, Yu and Patzelt, 2018). This research has linked the trait to greater engagement in entrepreneurship (Nicolaou, Shane, Cherkas et al., 2008), particularly in unstructured, informal, and legally uncertain contexts (Lerner and Hunt, 2012). However, we hypothesise that this effect will also extend to lack of premeditation. Wiklund et al. (2017) found that both sensation seekers, and those lacking premeditation are drawn to more uncertain entrepreneurial contexts and form higher entrepreneurial preferences. Like sensation seekers, those lacking premeditation have a high tolerance for uncertain situations (Whiteside and Lynam, 2001), and probably frame them as a source of positive experience rather than fear or danger (Berg et al., 2015), which should raise EBE (Tversky and Kahneman 1974). We, therefore, hypothesise that:

H1a: Sensation seeking is positively related to EBE.
H1b: Lack of premeditation is positively related to EBE.

In contrast, urgency and lack of perseverance have been relatively less explored in entrepreneurship research (Wiklund et al., 2018). Nevertheless, both of these traits have been theorized to relate to more aversive framing of uncertainty (Wiklund et al., 2018), suggesting that they probably exert opposite effects (i.e., negative effects) on EBE

compared to sensation seeking and lack of premeditation. Indeed, Wiklund et al. (2017) found that individuals high in urgency avoid uncertainty and form lower entrepreneurial preferences. Since individuals high in urgency exhibit poor tolerance for distress, risk, and uncertainty (Kaiser, Milich, Lynam et al., 2012), they typically frame uncertainty as a source of negative affective experience which should be avoided (Loewenstein, Weber, Hsee et al., 2001). By framing the uncertainty of the entrepreneurial decision problem as dangerous and anxiety-provoking, PT suggests that individuals high in urgency will exhibit decreased EBE (Trepel et al., 2005). Furthermore, a similar effect appears likely for lack of perseverance. Since individuals lacking perseverance struggle to remain focused on relevant information and resist distractions (Whiteside and Lynam, 2001), they tend to experience anxiety regarding whether they can correctly assess uncertain and challenging contexts (Zermatten and Van der Linden, 2008). That is, when a task is complex and challenging (such as considering an uncertain opportunity), an individual lacking perseverance tends to struggle to remain attentive and persevere with the task and consequently becomes anxious (Gay, Schmidt and Van der Linden, 2011). As a result, individuals lacking perseverance probably frame the uncertainty of the entrepreneurial decision problem as anxiety-provoking, leading to an aversion against such situations (Leland et al., 2006), which PT indicates should decrease EBE (Trepel et al., 2005). We thus hypothesise that:

H1c: Lack of perseverance is negatively related to EBE.

H1d: Urgency is negatively related to EBE.

2.3.2 Probability discounting: A deviation from reasoned entrepreneurial behaviour

While attraction to the uncertainty of an opportunity partly accounts for the impulsivity-EBE relationship, it does not adequately account for how impulsivity impels entrepreneurial behaviour through an unreasoned pathway. It thus remains necessary to theorise *how* an impulse-driven pathway deviates from the highly reasoned pathway of incumbent judgement-then-action models. Whether one considers entrepreneurial action through the lens of McMullen and Shepherd's (2006) Entrepreneurial Action Model, the Entrepreneurial Event Model (Krueger, 1993), or the Theories of Planned Behaviour and Reasoned Action (Ajzen, 2011), all rely on the common underlying rationality assumption inherited from classical Expected Utility Theory (Von Neumann and Morgenstern, 1947). The assumption holds that in choosing among alternative courses of action, an individual conducts a "cost-benefit calculus" of the feasibility (expectancy) and desirability (utility) of an opportunity and

only engages in entrepreneurial behaviour if this evaluative process indicates the opportunity will maximise their expected returns (McMullen and Shepherd, 2006; Miller, 2007). However, in deviating from this deeply rooted rationality assumption (Miller, 2007), PT explicitly acknowledges that reasoning varies between individuals as a function of how they weight the desirability versus feasibility of a choice (Trepel et al., 2005; Tversky and Kahneman, 1992). In particular, individuals high in certain impulsivity traits likely follow an unreasoned pathway, reflected in a tendency to act based on their desires, while disregarding the feasibility of their conduct (termed shallow probability discounting) (Green and Myerson 2013; Hofmann et al., 2009; Sharma et al., 2014). As illustrated in Figure 2.1, we thus posit that shallow probability discounting is a key mechanism explaining the impulsivity-entrepreneurial behaviour link. Rather than the typical case of feasibility perceptions hindering entrepreneurial behaviour, impulsive individuals may form intense EBE based on opportunity desirability, with limited evaluation of the associated challenges, such as resources impediments, uncertainty or poor practicability (Wiklund et al., 2018).

2.3.3 The mediating effect of the salience placed on desirability relative to feasibility

PT suggests that deviations in behaviour related to an opportunity (prospect) are linked to individual differences in attention towards the desirability versus feasibility of the opportunity (Tversky and Kahneman, 1974). Rational processing leads to more reasoned economic behaviour by encouraging systematic calculations of outcome desirability discounted against the subjective probability of occurrence (i.e., feasibility) (Tversky and Kahneman, 1992). As a result, rational analysis leads to the avoidance of uncertainty through behavioural inhibition (Green and Myerson, 2013). Alternatively, unreasoned processing systematically deviates from this more reasoned approach of avoiding uncertainty (Tversky and Kahneman, 1992) by less steeply discounting the value of uncertain, or low probability opportunities (Green and Myerson, 2013). As a result, a lack of reasoning likely increases action on uncertain opportunities (Trepel et al., 2005).

While the multiple dimensions of trait impulsivity reflect heterogeneous, contextually-dependent pathways to impulsive behaviour (Whiteside & Lynam, 2001), RST suggests that at a basic neurological level, such impulses can broadly be ascribed to variations in sensitivity towards potentially rewarding versus threatening stimuli (Carver, 2005; Gray, 1994). Accordingly, recent entrepreneurship research has pointed to RST as a lens for

integrating heterogeneous psychological constructs to predict less reasoned behaviour (Lerner et al., 2018a; Leung, Franken and Thurik, 2020). Reward sensitivity encourages impulsive processing due to a sensitivity and response to potential incentive cues, such as excitement, novelty, and the achievement of desires (Corr, 2004). In contrast, threat sensitivity encourages reflection due to a sensitivity and response to potential dangers, such as uncertainty and obstacles (Gray and McNaughton, 2000). Reward and threat sensitivity–which form the crux of RST (Corr, 2004; Gray, 1994)–thus closely overlap (both conceptually and in terms of mapping on similar brain regions), with the attentional bias toward the desirability/feasibility of an opportunity (Hall et al., 2011; Sanfey et al., 2006; Trepel et al., 2005). This enables us to parse the heterogeneous effects of the impulsivity dimensions on our hypothesised mediating construct.

Since sensation seekers focus on rewards with limited consideration of the challenges and prudence of their actions (Whiteside & Lynam, 2001), the trait is linked to high reward and low threat sensitivity in uncertain contexts (Berg et al., 2015). Furthermore, since insufficient premeditation involves acting without prior deliberation (Whiteside & Lynam, 2001), or assessment of one's capability to successfully perform an activity (Wiklund et al., 2017) the trait is linked to low threat sensitivity in uncertain contexts (Berg et al., 2015; Zermatten and Van der Linden, 2008). As high reward sensitivity encourages a focus on potential desires and low threat sensitivity decreases a focus on potential consequences (Carver, 2005; Gray, 1994), both sensation seeking, and lack of premeditation likely enhance the salience placed on the desirability of exploiting an opportunity, rather than any concrete evaluation of success probabilities or feasibility of that opportunity. In the inherently uncertain entrepreneurial context (Townsend et al., 2018), this unreasoned, shallow probability discounting pathway should enhance EBE (Tversky and Kahneman, 1992). Indeed, research has begun to empirically link high reward/low threat sensitivity to greater engagement in the entrepreneurial context, in essence, by theorising that more impulse-driven attention towards the possible rewards, rather than challenges, of entrepreneurial endeavours drives engagement (Geenen, Urbig, Muehlfeld et al., 2016; Lerner, Hunt and Verheul, 2018a). We thus hypothesise that:

> *H2a*: The salience placed on desirability relative to feasibility partially mediates the positive effect of sensation seeking on EBE.

H2b: The salience placed on desirability relative to feasibility partially mediates the positive effect of lack of premeditation on EBE.

In contrast, since urgency is related to a bias towards focusing on, and being sensitive to, negative and threatening information (Zermatten, Van der Linden, d'Acremont et al., 2005), the trait is associated with high threat sensitivity (Berg et al., 2015). Thus, since high threat sensitivity heightens the tendency to focus on and analyse potential obstacles (i.e., threats; Carver, 2005), urgency likely encourages highly rational processing of the feasibility and challenges of an opportunity. That is, by increasing threat sensitivity, RST predicts that urgency will increase reflection on uncertainty and potential dangers (Gray and McNaughton, 2000). Following PT, this reflection manifests in these individuals more heavily discounting opportunity feasibility and consequences against opportunity desirability (Tversky and Kahneman, 1992), resulting in uncertainty avoidance and reduced EBE (Green and Myerson, 2013).

Interestingly, lack of perseverance has specifically been associated with a lack of inner resolution or will to deal with adversity or challenge, a lack of desire to excel (Sharma et al., 2014), and an avoidance of risk-taking behaviours (Romer, Reyna and Pardo, 2016), such as exploiting an entrepreneurial opportunity. Consequently, rather than increasing reward or threat sensitivity, lack of perseverance lowers stimuli sensitivity, particularly reward sensitivity (Berg et al., 2015). As the counterfactual of heightened reward sensitivity which has been theorized above to increase unreasoned processing, it makes theoretical sense that a lack of reward sensitivity will decrease unreasoned processing (i.e., by increasing rational analysis). The low reward sensitivity of individuals lacking perseverance is often reflected in feelings of depression and lethargy (Carver and Johnson, 2018). This lethargic state should elicit a greater focus on, and discounting of, the “reality issues” of opportunity feasibility, since the individual is unwilling to excel based on reward but rather aims to pursue activities which they can feasibly undertake, given their lack of desire and volition (Berg et al., 2015). That is, following the predictions of RST, by decreasing sensitivity to reward, such as excitement, novelty, and the achievement of desires, lack of perseverance should encourage reflection (Gray and McNaughton, 2000). According to PT, this reflection will manifest as a greater focus on opportunity feasibility compared to desirability (Tversky and Kahneman, 1992), which results in increased avoidance of uncertainty through behavioural

inhibition (Green and Myerson, 2013). Therefore, both urgency and lack of perseverance are argued to enhance rational processing, resulting in a greater discounting of the value of high uncertainty or low feasibility outcomes, an associated increase in behavioural inhibition (Tversky and Kahneman, 1992), and lower EBE. We, hence, hypothesise the following:

H2c: The salience placed on desirability relative to feasibility partially mediates the negative effect of lack of perseverance on EBE.

H2d: The salience placed on desirability relative to feasibility partially mediates the negative effect of urgency on EBE.

2.4 METHOD

2.4.1 Sample and procedure

We collected two waves of survey data from individuals who currently own, and have a substantial role in operating, a business venture in South Africa. It remains unclear whether push (i.e., through poor fit in traditional workplace contexts) or pull (i.e., through attraction to acting entrepreneurially) factors encourage entrepreneurial behaviour among impulsive individuals (Antshel, 2018; Lerner, Verheul and Thurik, 2019). However, by virtue of being self-employed, any subsequent entrepreneurial behaviour undertaken by owner-managers cannot be an artefact of their impulsivity (or less reasoned judgement) pushing them out of traditional employment and into entrepreneurship. Therefore, relative to a sample of potential entrepreneurs, this sample allowed us to ensure that the observed results do not emerge out of necessity due to poor impulsivity-traditional employment fit, but rather reflect one's desires, which pull them towards entrepreneurial behaviour.

A national stratified random sampling frame of 20 000 owner-managers was obtained from a local market research firm. The sample was stratified based on industry, provincial location (Bureau for Economic Research, 2016), and gender (Herrington, Kew and Mwanga, 2017) proportions of owner-managers in the South African formal business sector. Data were collected using an online survey distributed via email with two bi-weekly follow-up emails. In total, 842 responses were collected for the first-wave, and 807 completed questionnaires were retained for a response rate of 4.21%.[2] Additionally, as a robustness test of the predictive validity of our theorised model, we collected the second wave of survey data from the sample of 807 first-wave respondents, which captured their entrepreneurial action 12 months later (n=221, response rate=27.4%). The full sample (n=807) consisted of 36.1%

female and 63.4% male respondents. The mean age was 50.4 years (SD=12.34), with 25% of respondents below 43, and 25% above 59 years of age.[3] Respondents' duration of business ownership experience ranged from a few months to 50 years, while the mean was 14.3 years (SD=9.74). The education level ranged from high school (13.1%), vocational training (22.2%), bachelors (19.3%), to a postgraduate degree (43.1%). The sample was reasonably representative of the larger target population in terms of industry, provincial location (Bureau for Economic Research, 2016), ownership duration (SEDA, 2019) and gender (Herrington et al., 2017).

Although appearing consistent with the population from which it was sampled, we further assessed the potential for non-response bias in our sample, following Armstrong and Overton (1977). Assuming late responses are more analogous to non-responses, we compared early and late respondents on various demographics (gender, age, industry, ownership duration, and education level), as well as substantive constructs in our model. No significant differences between the two groups were found ($p>0.05$). Additionally, we compared our sample to a random sample of 200 owner-managers from our sampling frame who did not return the survey, with no significant differences found between the two regarding industry dispersion, gender, and location ($p>0.05$).

2.4.2 Measures

Multidimensional Impulsivity (Wave 1). The extensively validated (Whiteside, Lynam, Miller et al., 2005) four-point Likert-type UPPS Impulsive Behaviour scale, developed by Whiteside and Lynam (2001), was used to measure the four distinct impulsivity dimensions. Each dimension is captured with 10 to 12 items for a total of 45 items.

Salience Placed on Desirability Relative to Feasibility (Wave 1). Despite its recognised importance (Schlaegel and Koenig, 2014), the salience placed on desirability relative to feasibility remains under-researched. Thus, we employed established procedures to develop a new measure (MacKenzie, Podsakoff and Podsakoff, 2011; Podsakoff, MacKenzie and Podsakoff, 2016). First, following our theoretical foundation, we defined the construct as a pattern of cognition resulting in an attentional bias towards the attractiveness, rather than the practicability of an entrepreneurial opportunity–where bias refers to a systematic deviation from the rational economic approach of evaluating outcome desirability

and weighing it against feasibility (Tversky and Kahneman, 1974). Based on this definition, we operationalised the salience placed on desirability relative to feasibility as an unidimensional, reflective construct that is relatively stable (i.e., demonstrates a pattern) over time in the entrepreneurial context. Second, we generated items via a deductive process, relying on (1) our construct conceptualisation, (2) reviews of the impulsivity (Hofmann et al., 2009), and entrepreneurial cognition (McMullen and Shepherd, 2006) literatures, and; (3) examination of related measures (Liberman and Trope, 1998; Tumasjan, Welpe and Spörrle, 2013). Consistent with prior research (Rutherford, O'Boyle, Miao et al. 2017; Scheaf, Loignon, Webb et al., 2020), we specifically sought items which would maximally explain the desired construct while limiting response fatigue. Limiting response fatigue was deemed particularly important given that impulsivity is associated with an inability to persist on tedious tasks (Whiteside and Lynam, 2001). Based on these principles, we settled on six items. Third, we assessed the content and face validity of the resulting six items by submitting them, along with the construct definition, to two subject-matter experts–professors in the field of entrepreneurial cognition. Further, we piloted the measure on 12 owner-managers by discussing the scale with them individually and gauging understanding of the construct. These assessments indicated the measure was reasonably understandable for the target population, required no rewording, and adequately captured the intended meaning of the construct.

The resulting 6-item, 11-point scale juxtaposed bipolar 1=low desirability/high feasibility versus 11=high desirability/low feasibility opportunity characteristics. Following probability discounting (Green and Myerson, 2013) and entrepreneurship (Tumasjan et al., 2013) research, we specifically juxtaposed low-high versus high-low desirability/feasibility characteristics as it enabled examination of how entrepreneurs weight desirability/feasibility trade-offs. Notwithstanding the fact that the alternatives (i.e., high/high, low/low desirability/feasibility characteristics) would not capture variance in this weighting function, the close interdependence between desirability/feasibility trade-offs is well recognised in the entrepreneurial action literature and is the more probable scenario faced by entrepreneurs (McMullen and Shepherd, 2006; Miller, 2007). For example, a highly attractive and novel product idea (highly desirable opportunity) typically carries with it increased uncertainty and investment requirements (lower feasibility). Opportunity desirability and feasibility were each denoted by two different characteristics. Perceived desirability reflects the degree of appeal

assigned to the pursuit of an opportunity, signifying the value of the action's end (Wiklund et al., 2017). Thus, following Tumasjan et al. (2013), two ends-related characteristics were used: (1) profit potential (high versus low) and (2) attractiveness of the product offering to consumers (high versus low) denoted high or low desirability characteristics, respectively. Feasibility reflects the perceived probability that an individual could successfully exploit an opportunity, signifying the degree of difficulty and practicability associated with the opportunity (Schlaegel and Koenig, 2014). Thus, consistent with Tumasjan et al. (2013), two means-related opportunity characteristics were used to denote high versus low feasibility: (1) competitiveness of the market the opportunity is placed in (very uncompetitive versus very competitive), and (2) the amount of personal capital investment required (low versus high). Consistent with a general perception of opportunity characteristics (as opposed to specifics, such as perceptions of the financial model) (Tumasjan et al., 2013), respondents rated the degree to which the opportunity characteristics were (1) positive, (2) promising, and (3) a realistic alternative to wage employment. A high (low) score indicates that an individual engages in less (more) steep probability discounting–placing greater salience on the desirability (feasibility) relative to feasibility (desirability) of an opportunity.

Entrepreneurial Behaviour Expectations (Wave 1). We captured EBE by adapting the single-item, seven-point scale by Kolvereid and Isaksen (2006).[4] Drawing from research aiming to predict more risky, unreasoned behaviours using behavioural expectations (Carrera et al., 2012; Gibbons et al., 2006), this EBE measure captures the self-predicted likelihood of engaging in entrepreneurial behaviour. Following Shane and Venkataraman's (2000) operationalisation of opportunity, respondents rated the likelihood (1=very unlikely to 7=very likely) that in the next 12 months, they would commence full-scale operations on a new product or service arising from a new opportunity they had recognised. Full-scale operations were defined as the scale required to produce and sell products and/or services to customers (Schoonhoven et al., 1990), and thus, represents the likelihood of engaging in behaviour to exploit an opportunity rather than simply testing the market (Choi and Shepherd, 2004). Consistent with Kautonen et al. (2015), a 12-month time frame was employed as it offered a suitable balance between capturing the immediacy and uncertainty of action (van Gelderen et al., 2015), while simultaneously allowing sufficient time to capture the practicalities[5] of exploiting an opportunity and the tendency for this exploitation to unfold over time (Wood et al., 2020).

Entrepreneurial Action (Wave 2). To longitudinally validate our theorised model in terms of predicting actual entrepreneurial action, we combined the scales of Kautonen et al. (2015) and van Gelderen et al. (2015). Consistent with the timeframe for our EBE measure, this five-item, five-point Likert-type scale captured entrepreneurial action in terms of the magnitude of effort and progress made towards exploiting an opportunity in the 12 months following the Wave 1 survey.

2.4.3 Analysis

Covariance-based structural equation modelling (SEM) was employed using the lavaan package (version 0.6-5) (Rosseel, 2012), in R with maximum likelihood estimation. We employed the SEM approach (c.f., MacKinnon, Lockwood, Hoffman et al., 2002) to test our model as it yields a suitable balance between type I error rates and statistical power while also allowing nested model comparison for theory testing. SEM was conducted in three steps: (1) evaluation of the measurement model, (2) evaluation of structural model fit, the risk of endogeneity, and hypothesised structural paths, and (3) bootstrapped indirect effect estimation for statistical inference (MacKinnon et al., 2002).

2.5 RESULTS

2.5.1 Measurement model

Exploratory (EFA) and confirmatory factor analyses (CFA) were employed to evaluate measurement model dimensionality, reliability, and validity. As a preliminary analysis, we utilised EFA with principal axis factoring extraction and Promax rotation to explore the factor structure of our novel mediating construct (Kline, 2016). EFA, based on Kaiser's (1974) criterion to retain factors with eigenvalues exceeding 1 and Parallel Analysis (6 variables × 797 respondents) (Montanelli and Humphreys, 1976) revealed a single latent factor with all items exhibiting strong factor loadings (>0.6). We next conducted CFA by inputting all items and the corresponding five factors into the analysis and allowing factor covariance. As CFA constrains cross-item loadings to zero (Kline, 2016), we specifically included our mediating construct in the CFA to conduct a more rigorous test of dimensionality and validity than EFA. The results indicated misspecification of the model due to several factor loadings (lambda [λ]) below the recommended 0.6 threshold on the impulsivity dimensions and two substantive measurement error covariances between items of our mediating construct

(CFI=0.805, TLI=0.796, IFI=0.806 and RMSEA=0.058). We subsequently deleted 13 items loading below 0.6 on their relevant impulsivity factors (Kline, 2016), resulting in 8, 8, 9 and 7 items for premeditation, urgency, sensation seeking, and perseverance, respectively.

While SEM generally assumes no residual covariances between error terms, it can be appropriate to allow this when a new measure is being developed, and conceptual coverage is more important than model parsimony (Little, Lindenberger and Nesselroade, 1999). Thus, we freed the error covariances between items DVSF1 and DVSF6, as well as DVSF2 and DVSF5, for our mediating construct (refer to items, loadings, and reliabilities in Appendix G). The final retained model showed acceptable fit (CFI=0.918, TLI=0.0.911, IFI=0.919 and RMSEA=0.044). Table 2.1 reports descriptive statistics, square roots of the average variance extracted (AVE), and correlations for the relevant factors in our model. Cronbach alphas and CRs of all factors exceeded the suggested minimum of 0.70, indicating acceptable reliability (Nunnally 1978). The square root of each construct's AVE exceeded its correlations with the other measurement model factors, indicating good discriminant validity (Fornell and Larcker, 1981).

Table 2.1: Descriptive statistics, correlations, and discriminant validity index

	M	SD	1	2	3	4	5	6
1. Sensation seeking	2.66	0.60	*0.645*					
2. Lack of premeditation	1.99	0.48	0.149**	*0.673*				
3. Lack of perseverance	1.79	0.45	-0.075*	0.291**	*0.670*			
4. Urgency	2.04	0.55	-0.008	0.186**	0.247**	*0.728*		
5. DVSF	7.83	1.83	0.112**	0.020	-0.129**	-0.119**	*0.730*	
6. EBE	5.24	1.80	0.193**	0.097**	-0.124**	-0.113**	0.145**	0.833
7. EA (n=221)	3.29	1.07	0.248***	0.076	0.70	-0.129*	0.076	0.346***

*p<0.05; **p<0.01 (2-tailed)

Notes: n=807; M=mean; SD=standard deviation; DVSF=salience placed on desirability versus feasibility; EA=entrepreneurial action captured in wave 2; The diagonal values (italicised) are the square root of the AVE.

2.5.2 Hypothesised model results

Our hypothesised partial mediation model was examined and demonstrated a good fit to the data (CMIN/DF=2.543, CFI=0.918, IFI=0.919, RMSEA=0.044, SRMR=0.048), allowing us to investigate the hypothesised paths. According to *H1*, (*a*) sensation seeking and (*b*) lack of premeditation are positively related, while (*c*) lack of perseverance and (*d*) urgency are negatively related to EBE. The results indicate that the standardised direct effects of sensation seeking (β=0.164, p<0.001), lack of premeditation (β=0.133, p<0.01), lack of perseverance (β=-0.126, p<0.01), and urgency (β=-0.098, p<0.01), on EBE were all significant and in the direction hypothesised. Thus, support is found for *H1a* to *d*.

According to *H2*, the salience placed on desirability relative to feasibility partially mediates the effect of multidimensional impulsivity on EBE. We examined these indirect effects, employing bootstrapping to generate more robust inferences (MacKinnon et al., 2002). Results (refer to Table 2.2) based on 5000 bootstrap samples and a 95% bias-corrected confidence interval showed that the salience placed on desirability relative to feasibility significantly mediated the relationship between: (1) lack of premeditation and EBE (β=0.009, p<0.01, CI=0.009 to 0.058), (2) lack of perseverance and EBE (β=-0.014, p<0.001, CI=-0.140 to -0.022); as well as (3) urgency and EBE (β=-0.012, p<0.001, CI=-0.113 to -0.016). However, while the direct effect of sensation seeking on EBE was significant, the indirect effect was not (β=0.005, p=0.119). These findings thus provide evidence for our partial mediation model and support *H2b*, *c* and *d*, but not *a*.

Table 2.2: Bootstrapped total, direct, and indirect effect estimates

Relationship	Effect	SE	LLCI	ULCI
Sensation seeking→DVSF→EBE				
Total	0.168***	0.144	0.330	0.893
Direct	0.164***	0.143	0.321	0.876
Indirect	0.005	0.015	-0.004	0.058
Lack of premeditation→ DVSF→EBE				
Total	0.142***	0.186	0.255	0.995
Direct	0.133**	0.185	0.211	0.947
Indirect	0.009**	0.020	0.009	0.093
Lack of perseverance→ DVSF→EBE				
Total	-0.140***	0.204	-1.061	-0.261
Direct	-0.126**	0.203	-0.996	-0.199
Indirect	-0.014***	0.029	-0.140	-0.022
Urgency→DVSF→EBE				
Total	-0.110**	0.149	-0.743	-0.156
Direct	-0.098**	0.147	-0.693	-0.113
Indirect	-0.012***	0.023	-0.113	-0.016

*p<0.05; **p <0.01; ***p<0.005

Notes: Results based on two-tailed tests. Effects reported in standardised form. SE=standard error; LLCI=lower-level confidence interval; ULCI=upper-level confidence interval; DVSF=salience placed on desirability versus feasibility.

2.5.3 Robustness analyses

To further assess the robustness of our results, we conduct five additional analyses. First, following Kline (2016), we compared the fit of several alternative nested models (refer to Table 2.3). We compared our partial mediation model to a full mediation model, a direct-effect model with the hypothesised mediator excluded (Model 3), and a model (Model 4) which reverses the mediator and outcome (i.e., rather than X→M→Y, we assessed X→Y→M). The alternatives did not produce a better fit according to the Chi-square Difference Test, as well as a comparison of AIC values and alternative fit indicators, suggesting that the theorised partial mediation model explains the data better (Kline 2016). Figure 2.2 illustrates these structural model results.

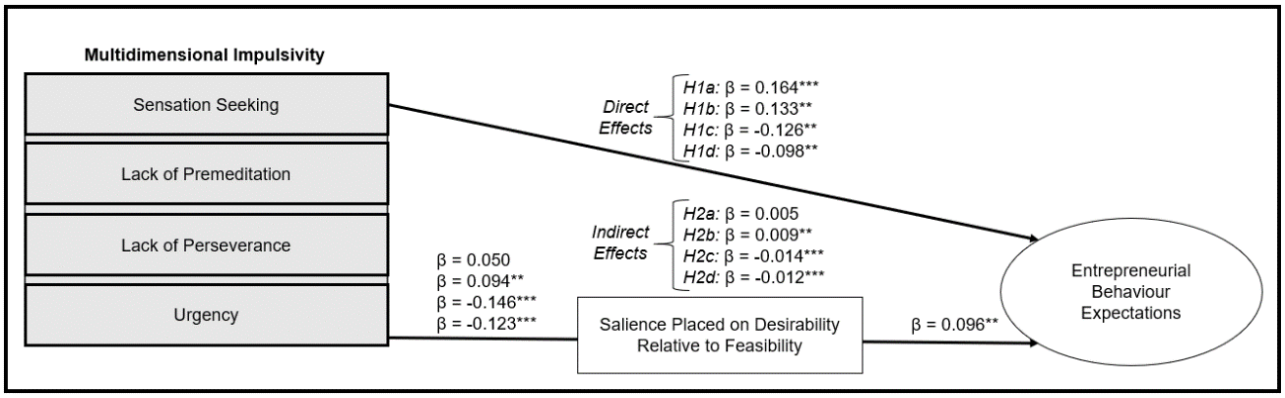
Table 2.3: Model comparison of fit indices

Model	χ^2	df	χ^2/df	IFI	*CFI*	RMSEA	$\Delta\chi^2$	Δdf	*AIC*
Partial mediation	1732.016	681	2.543	0.919	0.918	0.044			69813.257
Full mediation	1784.144	685	2.605	0.915	0.915	0.045	52.128***	4	69857.385
Model 3	2066.581	685	3.016	0.904	0.903	0.050	334.565***	4	70139.821
Model 4	1762.167	685	2.161	0.915	0.918	0.044	30.151***	4	69835.407

*p<0.05; **p<0.01; ***p<0.005

Notes: IFI=incremental fit index; CFI=comparative fit index; RMSEA=root mean square error of approximation; AIC=akaike information criterion

Figure 2.2: Impulsivity-entrepreneurial behaviour mediation model results



*p<0.05; **p<0.01; ***p<0.005

Second, we employed the instrumental variable (IV) approach by Antonakis, Bendahan, Jacquart et al. (2010) to address the possibility of endogeneity. For impulsivity, we included four IVs; two demographic IVs: age and gender; as well as two 5-point Likert-type IVs capturing the extent to which an individual feels "excited" and "distressed." For the salience placed on desirability relative to feasibility, we employed four IVs: (1) two 7-point Likert-type IVs capturing the preference for entrepreneurship over alternative careers (Krueger 1993); and (2) two 7-point Likert-type IVs capturing learning (Anderson, Covin and Slevin, 2009). All IVs met theoretical[6] and statistical[7] conditions for effective IVs—highly correlated with the predictor (relevance) and uncorrelated with the error term (exogeneity). With both conditions being met, we conducted a series of Hausman (Chi-squared Difference) Tests to assess each possible endogenous path. Each test was nonsignificant, thus indicating that endogeneity is not problematic for our model (p-values for rejecting the null of exogeneity>0.174) and that our results are relatively robust to endogeneity-related biases (e.g., reverse causality, omitted variables and common method bias).

Third, we also specifically tested for common method bias (CMB) using the CFA marker technique by Williams, Hartman and Cavazotte, (2010). We compared a series of five nested models that included a theoretically unrelated marker variable: a measure of respondents' hostile attitude towards others (3-item, Likert-type scale; 1=not at all hostile, 5=extremely hostile) (Watson and Clark 1994). This test indicated that the marker variable did not significantly bias the estimates of substantive factor correlations (Method-U vs. Method-R model; $\Delta\chi^2$=0.288, p=0.866), thus strengthening evidence that CMB is unlikely to threaten the validity of our study.

Fourth, we tested for the possibility that a portion of the mediating effects on EBE could be ascribed to antecedent-mediator interaction effects using PROCESS in SPSS (Preacher and Hayes, 2008). Testing each interactive effect piecewise revealed no significant interactions across the impulsivity dimensions ($p>0.1$), suggesting that our probability discounting construct mediates the effect of impulsivity on EBE rather than interacts with impulsivity to impact EBE.

Finally, we assessed the robustness of our model for predicting entrepreneurial action 12 months after the expression of EBE (n=221). Our measure demonstrated acceptable reliability (alpha>0.70) as well as validity (refer to Table 2.1), and including it as the ultimate explanandum in our SEM model resulted in acceptable model fit (CFI=0.901, IFI=0.902, and RMSEA=0.046). This allowed us to assess individual paths of the model. EBE was a positive predictor of action ($\beta=0.327$, $p<0.001$). Furthermore, employing the bootstrapping procedure outlined previously, the salience placed on desirability relative to feasibility had a significantly positive effect on action through EBE ($\beta=0.049$, $p<0.04$, CI=0.004 to 0.042), with all the paths of our original model (refer to Figure 2.2) remaining substantively similar. These results begin to demonstrate the robustness of our model in terms of predicting actual entrepreneurial action.

2.5.4 Post-hoc multi-group sensitivity analysis

As a further robustness check, we explored the influence of various potential moderating variables on the model, as suggested by previous literature (Antshel, 2018; Wiklund et al., 2018). We separated the sample into two, reasonably equally proportioned, groups and conducted multi-group analyses according to: (1) age and (2) duration of ownership experience–both split at the mean;[8] (3) education status–split at postgraduate degree level; (4) gender, and; (5) industry background–split between more dynamic versus less dynamic industries based on how technology-intensive, and how new (versus mature) the industry is, as typical indicators of dynamism and uncertainty (Wiklund et al., 2018). Following thresholds recommended by Chen (2007) ($\Delta CFI<0.01$ and $\Delta RMSEA<0.015$), all models passed tests for configural, metric, and scalar invariance, allowing us to constrain the intercepts and factor loadings to equality between groups and assess specific path differences using Chi-squared Difference tests.

Only four significant path differences were found (refer to Table 2.4). First, the lack of perseverance-EBE path is negative and significant for individuals with less than 14 years of ownership experience (β=-0.242; p<0.005), while nonsignificant for those with more than 14 years (β=-0.038; p=0.483). Second, the lack of premeditation-salience placed on desirability relative to feasibility path is significant for the group with more ownership experience (β=0.173; p<0.005), in contrast to their less experienced counterparts (β=-0.013; p=0.832). Third, while the sensation seeking-salience placed on desirability relative to feasibility path is nonsignificant for the older group (β=0.017; p=0.729), it becomes significant for the group below 50.4 years of age (β=0.130; p<0.05), resulting in a significant indirect effect on EBE (β=0.020, SE=0.039, p<0.05). Finally, while the salience placed on desirability relative to feasibility-EBE path is nonsignificant for owner-managers operating in less dynamic industries (β=-0.038, p=0.562), the path is significant in more dynamic industries (β=0.159, p=0.007), resulting in significant indirect effects for the more dynamic industry group (lack of premeditation: β=0.025, SE=0.063, p<0.05; lack of perseverance: β=-0.033, SE=0.092, p<0.01; urgency: β=-0.025, SE=0.060, p<0.01), but not the less dynamic group.

Table 2.4: Model-group comparisons

Paths	Gender	Age^	Industry	Ownership duration^	Education
Sensation seeking → DVSF	0.798	4.208*	0.822	0.360	0.007
Lack of premeditation → DVSF	0.009	2.046	1.313	4.146*	0.037
Lack of perseverance → DVSF	1.402	1.657	1.790	0.003	0.007
Urgency → DVSF	1.009	0.334	0.594	0.149	2.567
Sensation seeking → EBE	0.785	0.131	2.654	2.327	0.316
Lack of premeditation → EBE	0.119	0.178	0.732	0.118	0.030
Lack of perseverance → EBE	1.104	0.001	0.058	5.732*	1.199
Urgency → EBE	0.001	0.0463	1.848	0.025	0.715
DVSF → EBE	0.079	0.050	4.118*	0.267	0.570

*p<0.05; **p<0.01; ***p<0.005

Notes: Chi-squared difference values presented. ^Results from splitting the groups at the mean are presented. Upper and lower quartile splits yielded the same substantive results.

2.6 DISCUSSION

2.6.1 Theoretical implications

Despite impulsivity-entrepreneurship research suggesting limitations to the incumbent judgement-then-action perspective (Wiklund et al., 2017), until now, it remained unclear how impulsivity may impel unreasoned entrepreneurial behaviour. We developed and tested a model exploring an unreasoned pathway, and in so doing, offer several novel theoretical insights. First, we found support for our direct-effect hypotheses that sensation seeking and lack of premeditation positively, while lack of perseverance and urgency negatively, impact EBE. Incumbent entrepreneurial action models assume that individuals uniformly frame uncertainty as aversive, as something some could, at best, “bear” (McMullen and Shepherd, 2006). Yet, our findings suggest sensation seekers, and those lacking deliberation may frame uncertain entrepreneurial opportunities as attractive, thereby increasing EBE (Tversky and Kahneman 1974). Conversely, individuals high in urgency or low in perseverance appear to follow the predictions of incumbent models, framing uncertain opportunities as a source of negative affect, thereby lowering EBE. Prior work positively linking impulsivity with EI has been questioned as simply reflecting desire and not true behavioural likelihood (Antshel, 2018), particularly due to the poor conceptual overlap between impulsivity and reasoned-intentionality (Ajzen, 2011). However, our findings link impulsivity with EBE–a construct more strongly determined by feasibility considerations and non-volitional factors, such as uncertainty (Warshaw and Davis 1985; Wood et al., 2016). Furthermore, EBE significantly predicted actual entrepreneurial behaviour 12 months later. Our findings thus provide compelling evidence that impulsivity exerts an important impact on the entrepreneurial process, which extends beyond superficial desires to elicit a differential behavioural response to uncertainty.

Second, we reveal a mechanism driving the impulsivity-entrepreneurial behaviour link. Specifically, we predicted and found that individuals high (low) on lack of deliberation, but low (high) on urgency or lack of perseverance, place greater (less) salience on the desirability versus the feasibility of an opportunity, and this pathway results in higher (lower) EBE. We thus advance the impulsivity-entrepreneurship literature beyond a focus on impulsivity and other disinhibiting traits, which simply predispose individuals to unreasoned behaviours (Berg et al., 2015), to *which* of, and *how*, these traits may encourage entrepreneurial behaviour from an unreasoned perspective.

Drawing from RST (Gray, 1994), we show *which* of the heterogeneous impulsivity dimensions decrease probability discounting as a function of basic, neurological variations in reactivity to threat versus reward (i.e., unconsciously rather than through higher-order goals). While the sensation seeking-EBE indirect effect was nonsignificant, this may reflect our relatively older sample. Research indicates that impulsive behaviours resulting from sensation seeking decline with age (Duckworth and Kern, 2011), and our multi-group analysis indeed revealed that the sensation seeking-EBE indirect effect was significant for individuals below 50.4 years of age. Thus, our findings indicate that sensation seeking (at least for those below middle age) and lack of deliberation, traits associated with high reward and low threat sensitivity (Berg et al., 2015), encourage unreasoned behaviour based on shallow probability discounting. Alternatively, urgency and lack of perseverance, traits associated with low reward and high threat sensitivity (Berg et al., 2015), encourage one to pause and engage in more rational analysis and steep probability discounting. We thus provide a unifying lens for understanding which of the heterogeneous impulsivity dimensions encourage unreasoned entrepreneurial behaviour.

Additionally, by demonstrating *how* impulsivity impels unreasoned behaviour, we contribute to a lively and rapidly emerging scholarly debate regarding whether all entrepreneurial behaviour ought to be ascribed an intendedly-rational role. While research observing an impulsivity-entrepreneurship link suggests the presence of unreasoned pathways to entrepreneurial behaviour (Hunt and Lerner, 2018; Wiklund, 2019), the lack of mechanisms demonstrating this pathway has also encouraged attempts to subsume impulsivity within the judgement view by proposing the trait drives behaviour through higher-order, rationally-derived intentions (Wood et al., 2020; Brown et al., 2018). Moving beyond general psychological explanations for the impulsivity-entrepreneurship link (e.g., personality-environment fit), we draw from the more formal and robust models of reasoning provided by behavioural economics (PT; Sanfey et al., 2006; Tversky and Kahneman, 1992) to offer a specific, theoretically grounded mechanism demonstrating unreasoned behaviour. That is, we specifically demonstrate how the deeply-held rationality assumption in incumbent entrepreneurial action models–that entrepreneurs are rational actors who seek to maximise returns by evaluating opportunity desirability and weighing it against feasibility (McMullen and Shepherd, 2006)–does not hold for unreasoned behaviour. Rather, unreasoned

entrepreneurial behaviour is a distinct and empirically observable phenomenon, observed through a systematic decrease in the discounting of uncertain, low feasibility opportunities (Tversky and Kahneman, 1992). This is an important contribution, as it shows that attempts to subsume impulsivity within the judgement view (Brown et al., 2018; Wood et al., 2020) are untenable, since behaviour driven by rationally-derived intentions would invariably give rise to steeper discounting of low feasibility opportunities (Trepel et al., 2005). Overall, from both a basic neurological reactivity (Gray, 1994; Whiteside and Lynam, 2001) and behavioural economics (Tversky and Kahneman, 1992) perspective, our results support the existence of an unreasoned pathway. In so doing, we lend empirical weight to the emerging conviction that unreasoned pathways ought to have a distinct place alongside judgement-then-action theories of entrepreneurial behaviour (Lerner et al., 2018b; Wiklund, 2019).

This broadened view of the precursors to entrepreneurial behaviour further indicates a need to broaden understanding of what is considered theoretically relevant entrepreneurial behaviour–behaviour leading to opportunity exploitation–in the first place (Lerner et al., 2018b). While scholars have generally relied on EI to mark commencement of the entrepreneurial process and distinguish entrepreneurial, from other behaviour (Brown et al., 2018; McMullen and Shepherd, 2006; Wood et al., 2020); our work offers some headway towards a broader view called for by van Lent et al. (2021). We show that through EBE, a lack of reasoning can predict a meaningful portion of actual entrepreneurial behaviour 12 months later. Thus, by providing space for the possibility that behaviour can precede deliberate reasoning and may not be under full volitional control (Gibbons et al., 2006), EBE may begin to facilitate this broader understanding. For example, rather than entrepreneurial behaviour being identified by a concrete belief that one's behaviour is a preferred means to a goal (EI), perhaps all that is required is a perceived likelihood (EBE), whether intentional or not, that this behaviour could possibly result in exploitation of an opportunity. This broader perspective may not only better facilitate capturing unreasoned, early-stage entrepreneurial behaviours (Lerner et al., 2018b), but may also eschew reliance on views of the entrepreneur as some prescient progenitor who follows a linear entrepreneurial path, unaffected by personal impulses or factors out of their volitional control (Dimov, 2011).

Third, while post-hoc tests of moderating effects indicated that our theoretical model remained robust to (even relatively extreme) demographic variations, we did find two

noteworthy effects. First, the lack of premeditation-salience placed on desirability relative to feasibility path was positively moderated by entrepreneurial experience. This finding reinforces the distinctiveness of impulse-driven entrepreneurial behaviour as a behavioural logic. Entrepreneurial experience is generally associated with increased domain knowledge (McMullen and Shepherd, 2006). Research shows this knowledge enhances awareness of, and a focus on, opportunity feasibility (Baron and Ensley, 2006), even encouraging one to place more importance on their means and what they can feasibly enact, rather than desirability and potential returns (Dew et al., 2009). Yet this is not the case for those lacking deliberation. These individuals' insensitivity to threat and negative experiences (Zermatten et al., 2005), and likely bias regarding the upside of entrepreneurial experiences (Wiklund et al., 2018), appears to only intensify their urge to act on opportunities while disregarding the feasibility. Despite their becoming increasingly aware of the consequences, lack of deliberation encourages shallow probability discounting, reinforcing the view that impulsivity can drive unreasoned entrepreneurial behaviour despite, rather than simply due to a lack of, awareness of the consequences (Hofmann et al., 2009; Lerner et al., 2018b). Second, the mediated effect of multidimensional impulsivity on EBE was positively moderated by uncertainty. PT suggests that individuals engaging in shallow probability discounting will be encouraged to act regardless of the uncertainty and consequences, while behaviour will be strongly inhibited by uncertainty for more rational individuals (Tversky and Kahneman, 1992). We find empirical support for this notion, which highlights the centrality of uncertainty to the explanatory logic of our model: a lack of reasoning encourages entrepreneurial behaviour by overcoming the inhibitory effects of uncertainty (van Gelderen et al., 2015).

Finally, we begin to advance a probability discounting mechanism and measure which can enrich understanding of this unreasoned pathway. The measure was developed and tested through a range of content, convergent, discriminant, and nomological validity tests, and presents a promising preliminary attempt at empirically capturing an unreasoned pathway to entrepreneurial behaviour. Our theorised model behaved as predicted through a range of direct, indirect, invariance, moderation, validity, and endogeneity, tests–giving us confidence that the measure is a valid indicator of the focal construct (MacKenzie et al., 2011; Podsakoff et al., 2016) that can contribute to future investigations aiming to incorporate impulse-driven precursors of entrepreneurial behaviour. Moreover, our theorising that unreasoned behaviour is a function of basic, neurological variations in reward and threat sensitivity

(Gray, 1994) suggests broader applicability of our discounting measure as a unifying lens for understanding a range of personality, psychopathological, and biological factors which may increase unreasoned entrepreneurial behaviour. For example, entrepreneurship scholars have shown interest in various possible unreasoned precursors to entrepreneurial behaviour, such as ADHD, narcissism, and hypomania (Leung et al., 2020), addiction (Spivack and McKelvie, 2018), and a lack of sleep (Gunia, Gish and Mensmann, 2021); all of whom appear to rely on the variations in reward and threat sensitivity rooted in these precursors (Bijttebier, Beck, Claes et al., 2009), as explanations for heightened unreasoned behaviour.

2.6.2 Practical implications

From a practical standpoint, the results of this article may prove useful to entrepreneurship pedagogy, practice and policy, which are all concerned to some degree with facilitating entrepreneurial behaviour, particularly under uncertainty (Townsend et al., 2018). While judgement-then-action models suggest the importance of gaining knowledge to overcome uncertainty and engage in entrepreneurial behaviour (McMullen and Shepherd, 2006), our results suggest some merit to an unreasoned approach that disregards uncertainty, probabilities, and issues of feasibility. We thus begin to offer an alternative prescriptive lever to enhance entrepreneurial behaviour under uncertainty.

Additionally, individuals should be aware of their impulsive predispositions toward unreasoned versus reasoned processing due to its effect on entrepreneurial behaviour. While seen as a limitation in more traditional careers (Antshel, 2018), our results suggest that impulsive individuals could benefit from leveraging the trait to pursue entrepreneurial opportunities. However, while this unreasoned pathway may encourage entrepreneurial behaviour, care should be taken since a disregard for feasibility will also probably entrench fatal flaws within the pursuit (Lerner et al., 2018c). We thus offer a promising, yet cautionary note for those seeking to manage the effects of impulsivity in entrepreneurship. In terms of managing these effects, our research indicates that context matters. A tendency towards unreasoned processing only appears to enhance EBE in more uncertain and dynamic contexts. Since potential outcomes are unknown and unknowable in uncertain contexts (Townsend et al., 2018), *ex-ante* information is of little value anyway, and fast, active experimentation is probably rewarded (Wiklund et al., 2018). We suggest that impulsive

individuals pursue these contexts, as the action-orientation of impulsivity is rewarded while the costs of limited reasoning are mitigated. Moreover, while trait impulsivity is considered relatively stable (Whiteside and Lynam, 2001), there are tools to influence one's receptivity to various opportunity stimuli (c.f., Wiesenfeld, Reyt, Brockner et al., 2017). While beyond the scope of this text, these tools may assist in managing impulsive outcomes depending on the levels of uncertainty in the venturing context. For example, in highly uncertain contexts, our research indicates that individuals high on urgency or lacking perseverance should seek tools to limit their focus on potential threats and uncertainty, due to its inhibitory effects.

Finally, these implications extend to traditional policy and pedagogical approaches, which may currently be overly circumscribed. These approaches often focus on the inculcation of tools such as business planning, which seek to enhance a focus on feasibility (Brush and Noyes, 2012), based on the judgement-then-action assumption. Our research suggests that these approaches should also include less reasoned perspectives as they offer valuable insight into entrepreneurial behaviour and, in contexts characterised by dynamism and uncertainty, can be leveraged to circumvent behavioural inhibition.

2.7 LIMITATIONS AND FUTURE RESEARCH RECOMMENDATIONS

Although our findings offer valuable insight into the impulsivity-entrepreneurship relationship, a few limitations should be noted. First, we emphasise that entrepreneurial behaviour is not synonymous with performance. While we show how impulsivity encourages unreasoned behaviour, future research could benefit from an assessment of the performance implications. Second, we tested our model among owner-managers, who likely have differing perceptions of entrepreneurial opportunities relative to potential entrepreneurs. Research suggests a degree of familiarity with a behaviour may encourage impulsivity (Evans, 2008), and it is plausible that potential entrepreneurs who are entirely new to entrepreneurship are less likely to follow an unreasoned pathway. While our model remained robust to relatively extreme variations in entrepreneurial experience, we still cannot directly comment on the presence of an unreasoned pathway for potential entrepreneurs. Future research could fruitfully assess if our model extends to this group.

Third, we note that while the paths from our mediator to EBE, as well as the concomitant indirect effects were significant, the effect sizes were relatively small (although post-hoc analyses revealed a substantial increase in more dynamic contexts). This indicates that there is room for further investigation to capture a more comprehensive picture of the impulsive precursors to entrepreneurial behaviour. Indeed, we embrace the modern view that human behaviour is a function of dual pathways, where both reasoning and a lack thereof contribute to explaining behaviour (Deutsch and Strack, 2010), particularly throughout the complex entrepreneurial process. Furthermore, it is well-acknowledged that empirically capturing less reasoned entrepreneurial behaviours is elusive, and research from this perspective is nascent (Hunt and Lerner, 2018; Lerner et al., 2018b). Therefore, our goal with the development of the mediating construct in this article is to stimulate future research aimed at empirically capturing this less reasoned pathway and outcomes associated with it. These outcomes can extend beyond behaviour to explore aspects such as team formation, resource acquisition and coordination (Lerner et al. 2018b).

Finally, while we used a unidimensional measure for our mediating construct to facilitate examination of how entrepreneurs weight desirability/feasibility trade-offs, this precluded us from developing more fine-grained understanding of their probability discounting functions. Future research could benefit from more fine-grained investigations, perhaps by employing conjoint designs that present many alternative manipulations of desirability/feasibility characteristics to more precisely capture differences in probability discounting. Nevertheless, concerns over opportunity feasibility have always been a central issue inhibiting entrepreneurial behaviour (McMullen and Shepherd, 2006). So, by showing that impulsive individuals less steeply discount the value of low feasibility opportunities, we provide evidence that an impulse-driven pathway will increase action-likelihood throughout the various desirability/feasibility combinations relative to a reasoned approach which more steeply discounts feasibility.

2.8 CONCLUSION

Although offering substantial potential to expand scholarly insight, investigations of unreasoned precursors to entrepreneurial behaviour are simultaneously empirically elusive and problematic for the deeply-held rationality assumption in theories of the entrepreneur. This article sought to address these challenges by theorising and testing how impulsivity

impels unreasoned entrepreneurial behaviour. By illustrating how an unreasoned pathway deviates from the incumbent judgement-then-action perspective, we offer valuable insights into how this pathway can begin to be productively captured and incorporated in theories of entrepreneurial behaviour. As pointed out by Lerner et al. (2018b), the incorporation of an unreasoned perspective in theories of entrepreneurial behaviour has the potential to significantly advance the field, bringing it closer to the reality it seeks to explain. This article aims to offer an empirically grounded foundation as scholars strive to move ever closer to capturing this reality.

2.9 ENDNOTES

[1]To illustrate, while individuals high on urgency appear drawn to impulsive behaviours, such as problematic alcohol and substance use, they typically withdraw from engaging in distressing, risky and uncertain contexts (Kaiser et al., 2012).

[2]Meta-analytic evidence indicates that low response rates offer little evidence of selective reporting and have limited impact on entrepreneurship research, as they simply show the sample was not confined to those who would readily respond (Rutherford et al., 2017).

[3]While this age distribution is slightly older than the current profile of owner-managers in South Africa, the mode is similar at 46 years of age (SEDA, 2019). Furthermore, post-hoc analyses indicate that our model is relatively robust to variations in age.

[4]While the merit of multi-item measures is acknowledged, research indicates single-item measures are equally effective for concrete constructs (Bergkvist, 2015), such as EBE (Wood et al., 2016). We thus relied on a single item with demonstratable face (Choi and Shepherd, 2004), and convergent validity (Kolvereid and Isaksen, 2006).

[5]Since research associating impulsivity with EI may simply reflect desire (Antshel, 2018), and EBE may overcome this limitation by incorporating personal and non-volitional factors (Warshaw and Davis 1985), we assessed discriminant validity of the EBE measure by correlating with an entrepreneurial desirability measure (Krueger 1993). The Pearson correlation between these measures was small (0.18), supporting discriminant validity.

[6]IV theoretical arguments for relevance and exogeneity conditions can be provided upon request from the corresponding author.

[7]All IVs were significant and valid predictors of their intended constructs ($p<0.029$; Wald Test>29); indicating relevance (Sande and Ghosh, 2018). Furthermore, the Sargan-Hansen Chi-squared Test met the criteria of CMIN/DF<3.0 (West et al., 2012), and no significant differences in Chi-squared statistics would occur if any IV-predicted variable disturbance term covariances were added; indicating exogeneity (Antonakis et al., 2010).

[8]Since our sample was slightly older than related impulsivity-entrepreneurship studies (Dimic and Orlov, 2014; Wismans et al., 2020) and consisted of experienced owner-managers, we conducted additional multi-group analyses on age and ownership duration using an extreme group approach (Preacher et al., 2005). Splitting groups into lower and upper quartiles (age <43 years and >59 years; ownership duration <7 years and >19 years) revealed no substantive differences from the original multi-group analyses, indicating the overall relevance of our model to these more extreme demographic variations.

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CHAPTER 3 (PAPER 2):

SUITABLY IRRATIONAL? A DUAL-PROCESSING ACCOUNT OF IMPULSIVITY IN THE PURSUIT OF HIGH-QUALITY VENTURE IDEAS

Chapter 3 presents Paper 2. This paper presents a mechanism explaining *how* impulsivity affects venture idea quality and has been submitted to the Strategic Entrepreneurship Journal.

3 **ABSTRACT***Despite mainstream understanding of entrepreneurship as a rational undertaking, emerging research suggests trait impulsivity is also an important driver of entrepreneurial pursuits. Yet, knowledge of the quality of these pursuits and the cognitive processes underlying them is lacking. This paper investigates emotion-neutral disinhibition and emotion-driven hedonic impulses as distinct processes explaining impulsivity's impact on venture idea quality. Two studies, a prospective survey and experiment, illuminate these distinct impulsive pathways. The findings advance important implications for understanding the underpinnings of venture idea pursuit by demonstrating that the fundamental ability to pursue high potential ideas requires one to harness both rational and visceral faculties; to blend unemotional analysis with less deliberative, intuitive processes. The implications extend to theories of entrepreneurial and strategic action under ineliminable uncertainty, and the inclusion of distinct reasoning Types within them.*

Keywords: Impulsivity, disinhibition, analysis, hedonic impulses, dual-processing, venture idea quality

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3.1 INTRODUCTION

The difference between mere survival, extraordinary success, or devastating failure of a venture start-up attempt centers, in part, around the quality of the venture idea pursued (Baron & Ensley, 2006). In the entrepreneurship literature, this recognition is evinced in the notion that what ultimately animates entrepreneurship is the venture idea one is actually willing to pursue (Townsend, Hunt, McMullen, & Sarasvathy, 2018). In the strategy literature, this recognition is evinced in the notion that, in order to create and capture value, the only business model that is relevant is the one actually realized (Demil, Lecocq, Ricart, & Zott, 2015). Thus, a fundamental goal of strategic entrepreneurship research is understanding what drives individuals' pursuit of venture ideas with high commercial potential (Dimov, 2011). Indeed, scholars have investigated the phenomenon through various lenses; including effectuation (Sarasvathy, 2001), sensemaking (Hoyte, Noke, Mosey, & Marlow, 2019), simulating future idea scenarios and the potential causal maps for these ideas (Frederiks, Englis, Ehrenhard, & Groen, 2019), deliberate constrained information search (Fiet, Piskounov, & Patel, 2005), as well as deductive (Packard & Clark, 2020) and inductive reasoning to "rationalize" and justify the worth of an idea (Cornelissen & Clarke, 2010).

Yet, these research models have commonly assumed that entrepreneurs (Lerner, Hunt, & Dimov, 2018), and venture managers (Hodgkinson & Healey, 2011), are rational actors who analyze their idea in some manner prior to acting. In particular, McMullen and Shepherd's (2006) two-stage framework of action on a venture idea has served as a foundational basis for many of these models (Townsend, Hunt, & Manocha, 2021), leading to the general assumption that entrepreneurs only pursue ideas that have *ex ante* been determined as commercially valuable through an analysis of expected returns. However, to pursue a venture idea is to act under some degree of outcome uncertainty (Knight, 1921), and this observation poses a dilemma for the analytical assumption of venture idea pursuit models which remains to be researched and reconciled (Lerner, Hunt, & Dimov, 2018).

New venture ideas–the imagined future "combinations of product/service offerings, markets, and means of bringing these offerings into existence" (Davidsson, 2015, p. 675)–are typically accompanied by significant outcome uncertainty (Frederiks et al., 2019). Partly varying as a function of idea novelty (Ramoglou, 2021), uncertainty has long been considered a necessary precursor to achieving greater commercial returns from entrepreneurial action (Knight, 1921; McMullen & Shepherd, 2006). Yet, to act under uncertainty is to demonstrate a disregard for the potential consequences and a deviation from the return-maximizing ideals current models espouse (Pietersen & Botha, 2021). Although recognition of this uncertainty-analysis tension has sparked recent efforts to understand the reasoning logic one ought to follow when acting on venture ideas (Packard & Clark, 2020; Rapp & Olbrich, 2020), this work has yet to expand beyond its analytical roots: The prescriptions remain confined to the analytical precepts of expected return maximization; either long term (via distant causal predictions) or incrementally (via the more near-term rules of effectuation), depending on the degree of uncertainty faced (Packard & Clark, 2020). While certain venture idea elements may be knowable and therefore amenable to analysis, in aggregate, novel venture ideas tend towards ineliminable uncertainty (Ramoglou, 2021). Thus, since "[analysis] appears to indicate it is not possible" to act productively under ineliminable uncertainty (Arend, 2020, p. 703), there remains a need to extend beyond current analytical accounts of the reasoning logic underlying the pursuit of high potential ideas.

A promising development in this regard is recent evidence that trait impulsivity is a substantive driver of entrepreneurial action under uncertainty (Wiklund, Yu, Tucker, & Marino, 2017). Impulsiveness is conceptualized as action "on immediate urges, either before …or despite consideration of negative consequences" (DeYoung & Rueter, 2010, p. 487). As such, impulsiviness appears particularly relevant to understanding the pursuit of uncertain venture ideas which require at least some disregard of the consequences (Lerner, 2016). However, accounts of impulsiveness as a reasoning logic (or cognitive strategy; Shepherd, Mcmullen, & Jennings, 2007), not a general trait, in entrepreneurship are only just emerging (Lerner, Hunt, & Dimov, 2018; Pietersen & Botha, 2021; Moore, McIntyre, & Lanivich, 2021) and remain underdeveloped (Leung, Franken, & Thurik, 2020). These accounts have focused on directly demonstrating how impulsiveness deviates from rational analysis to drive entrepreneurial action, unwittingly leading to a unitary portrayal of impulsiveness as disinhibition, a lack of analysis. Although useful in providing a descriptive account of impulsiveness, by framing expected utility as the counterfactual, these accounts offer limited new insights into the reasoning logic one ought to follow when acting on venture ideas (Miller, 2007). Despite the limitations of rational analysis in explaining action on uncertain but potentially commercially valuable ideas, it is not clear how disinhibition as a thoughtless lack of analysis (Epstein, 2000) could reasonably explain the pursuit of quality ideas either. As a result, research has yet to offer reasonable, evidence-based alternatives to rational analysis in explaining venture idea quality (henceforth, VIQ). Failure to more deeply explore these alternatives risks limiting the ability of entrepreneurship theory to account for the pursuit of potentially lucrative, novel, but uncertain venture ideas.

Going beyond the confines of expected utility, I challenge unitary conceptions of entrepreneurial reasoning from comprehensively analyzed to disinhibited and empirically examine how various impulsive traits impact VIQ from a dual reasoning perspective. Drawing from Cognitive–Experiential Self-Theory (CEST) (Epstein, Pacini, Denes-Raj, & Heier, 1996), I advance the notion that impulsiveness not only manifests through a lack of analytical Type processing (i.e., disinhibition) but also over-activation of hedonic impulses from intuitive Type processing. I posit that as a distinct processing Type unfettered by rule-based reasoning and consequential analysis (Evans & Stanovich, 2013), hedonic impulses

offers substantial potential for new insights into decision effectiveness (Hodgkinson & Healey, 2011), particularly VIQ. Yet, since the efficacy of this processing Type appears dependent on past experience (Epstein, 2003), I further examine the moderating effect of entrepreneurial experience (i.e., prior venture idea pursuit) on the hedonic impulses-VIQ pathway. Across two studies, I explore the formation of (Study 2) and willingness to act on (Study 1 and 2), ideas which one is confident are worthwhile, commercially valuable pursuits. Following the creativity literature (Amabile, 1982), I conceptualize VIQ as the commercial potential of the venture idea (Vogel, 2017), not only reflecting novelty but also usefulness to a customer base which facilitates value capture (Ward, 2004). Thus, I draw from prior work (Baron & Ensley, 2006; Santos, Caetano, Baron, & Curral, 2015) to capture VIQ as a superordinate construct encompassing the degree to which an idea is (1) novel, (2) meets an unmet need, and (3) presents a favorable financial model.

This paper makes two noteworthy contributions. First, I illuminate a broader, dual-process understanding of impulsiveness and the potential efficacy thereof for VIQ. I thereby unravel understanding of action on novel but uncertain venture ideas beyond the confines of the prevailing analytic models. Second, the cross-sectional, self-report surveys of current impulsivity-entrepreneurship research raise endogeneity concerns (Antonakis, Bendahan, Jacquart, & Lalive, 2010). These concerns have promoted scholarly disagreement on whether a trait impulsivity-entrepreneurship link demonstrates impulsiveness at all, or whether the link indicates some plausible alternative but fully analytical explanation (Brown, Packard, & Bylund, 2018). By triangulating the prospective survey with an experiment, I begin ruling out these alternative explanations and advance an important debate regarding the role of impulsiveness in entrepreneurship (Hunt & Lerner, 2018; Wiklund, 2019).

3.2 THEORETICAL FOUNDATION

3.2.1 Venture idea quality within a framework of dual reasoning processes

Although research has accumulated on the factors influencing the generation of ideas (Grégoire, Shepherd, & Schurer Lambert, 2010), this paper examines the quality of ideas for which an individual considers commercially worthwhile to pursue. While individuals may generate or discover any number of ideas, what ultimately animates entrepreneurship are the ideas actually considered worthwhile to pursue (McMullen & Shepherd, 2006). It is at

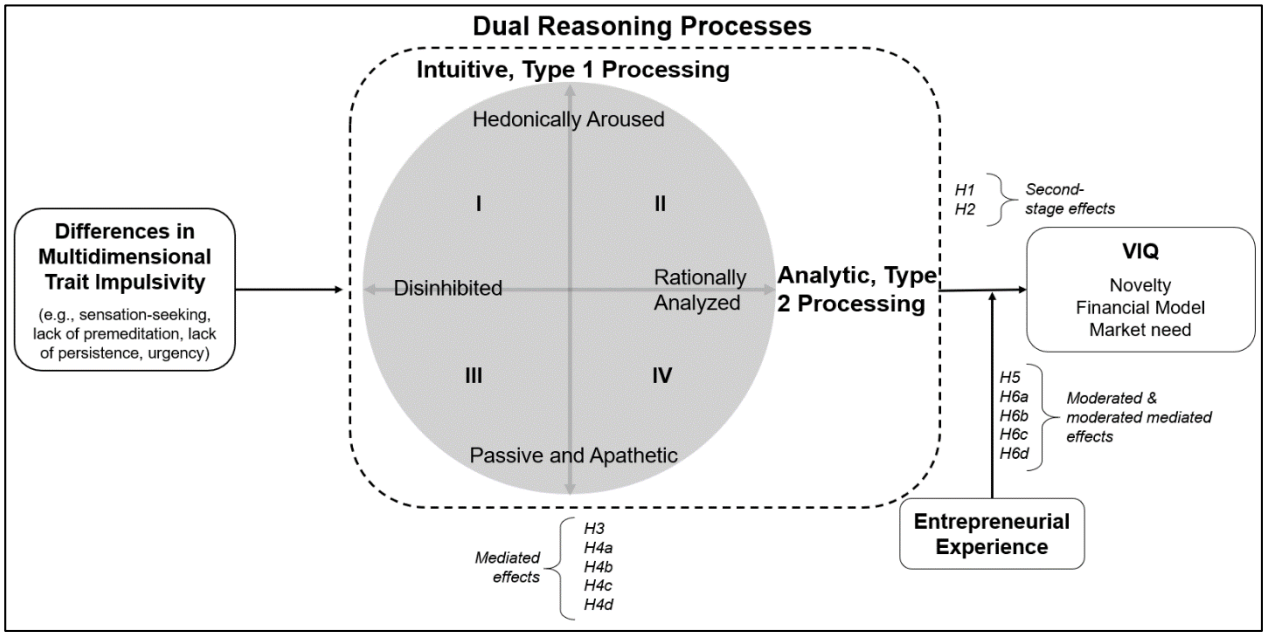
this stage that the uncertainty and obstacles of the idea must be accepted and fully shouldered for the idea to have any chance of fruition (Townsend et al., 2018). Whether determined after significant evaluation or impulsively (Hunt & Lerner, 2018), the decision that an idea is a worthwhile pursuit despite the uncertainty is arrived at using a particular decision logic or strategy (Shepherd et al., 2007). Understanding these entrepreneurial decision logics has been the source of a growing breadth of research, through constructs such as effectuation, heuristics, market learning, emotion, intuition (Kuratko, Fisher, & Audretsch, 2020), sensemaking (Hoyte et al., 2019), future idea scenario simulation (Frederiks et al., 2019), and inductive reasoning (Cornelissen & Clarke, 2010). However, in articulating the value thereof to VIQ, this research has predominantly retained a view of the entrepreneur as evaluative and analytical (Miller, 2007).

To illustrate, effectuation, characterized by assessing and selecting the best effect given a set of means (Sarasvathy, 2001), and heuristics, conceptualized as deriving a rudimentary yet logically reasoned outline of how to act (Bingham, Howell, & Ott, 2019), remain governed by "intendedly-rational rule-directed" processing as the basis for venture idea pursuit (Lerner, Hunt, & Dimov, 2018, p. 57). Research on market learning suggests that learning from a venture's prior market experiences (whether directly or vicariously) is essential to the identification of the market needs underlying a novel venture idea as it enables detection, reflection and understanding of the causal patterns underlying market needs (Bao, Wei, & Di Benedetto, 2020). Work on emotion regulation (He, Sirén, Singh, Solomon, & von Krogh, 2018), negative affect (Byrne & Shepherd, 2015), and positive affect (Baron, Hmieleski, & Henry, 2012) suggest benefits to entrepreneurship only in so far as these constructs motivate reflection, analysis, and self-regulation of one's cause-effect judgments about a venture idea. Entrepreneurs' intuition is posited as beneficial to entrepreneurs only to the extent that it triggers intentional venture idea development, assessment, and pursuit (Dimov, 2007; Ravasi & Turati, 2005). Similarly, sensemaking (Hoyte et al., 2019), future idea scenario simulation (Frederiks et al., 2019), idea forecasting using imagination (Kier & McMullen, 2018), and inductive reasoning (Cornelissen & Clarke, 2010), are all theorized to benefit VIQ to the extent that they enable one to "rationalize", or assess, the value of an idea and the key causal inferences underlying its potential success.

In this sense, strategic entrepreneurship research has generally assumed rational analysis as the quintessential authority governing high VIQ (Lerner, Hunt, & Dimov, 2018; Martins, Rindova, & Greenbaum, 2015). And McMullen and Shepherd's (2006) seminal article has served as the grounding basis for this assumption: In deciding whether an idea is worthwhile to pursue, an entrepreneur engages in rule-based assessment of the desirability (utility) and feasibility (expectancy) thereof to maximize expected returns. Yet, emerging work, drawing on Prospect Theory and the broader bias and heuristics program (Tversky & Kahneman, 1974, 1992), has shown that impulsivity can encourage one to focus and act on the desirability (i.e., potential returns) of an idea without analytical processing intervening to assess the feasibility and uncertainty thereof (Pietersen & Botha, 2021). Although fruitfully demonstrating that trait impulsivity can impel entrepreneurial action on a venture idea despite the uncertainty faced, it remains difficult to imagine that this lack of analytical rigor and consideration of the implications results in anything more than unrefined, inherently flawed, and impractical venture ideas (Lerner, Hunt, & Verheul, 2018). I thus posit that achieving high VIQ requires a somewhat elusive balance between an unfettered vision and analysis of the pragmatics of an idea (Baron, Mueller, & Wolfe, 2016) that cannot be fully accounted for by the analytical precepts of current decision logic models, nor by disinhibition.

According to CEST, there are dual, largely orthogonal analytical and intuitive processing Types that account for the effects of reasoning on decision effectiveness (Epstein, 2003). Analytical, Type 2 processing is emotion-neutral, operates at the conscious level, and enables information acquisition and use through intentional, effortful engagement in deliberative analysis, rule-based reasoning, and cause-effect judgment (Hodgkinson, Langan-Fox, & Sadler-Smith, 2008). In contrast, intuitive, Type 1 processing is emotion-driven, operates at an automatic, preconscious level, and enables quicker information acquisition and use through recognizing patterns and drawing holistic associations in the form of similarity-based retrieval (Epstein et al., 1996). Thus, as illustrated in Figure 3.1, the reasoning space can be depicted as a circumplex, organized around the two principal axes of rational analysis and intuition (Hodgkinson & Healey, 2011).

Figure 3.1: Theorizing a dual-process model explaining the effect of impulsivity on VIQ



According to this circumplex, analytic processing exists on a continuum from comprehensively analyzed to disinhibited, whereas intuitive processing exists on a continuum from visceral, hedonically-driven impulses to emotional disengagement and apathy (Pacini & Epstein, 1999). In trying to understand the reasoning processes underlying effective decisions (such as VIQ), entrepreneurship (c.f., Lerner, Hunt, & Dimov, 2018; Wiklund, 2019), and strategic management (Hodgkinson & Healey, 2011), research have almost exclusively focused on the rational axis, leading to an unidimensional view of reasoning that downplays the significance of autonomous intuitive processing. Moreover, the almost singular focus on first assessing whether a deviation from analytical processing in fact occurs in entrepreneurship (e.g., Brown et al., 2018; Pietersen & Botha, 2021), has currently left scholars unable to disentangle whether this ostensible impulsiveness emerges as a result of limited of Type 2 analysis, due to Type 1 impulsive processing, or some combination thereof. I thus contend that to more fully understand the reasoning logics underlying entrepreneurial decision effectiveness (e.g., VIQ), there remains a need to explicitly investigate a broader panoply of impulse-driven, unreasoned processes depicted in the reasoning circumplex and disentangle the dual processes as parallel mechanisms (Julmi, 2019). Impulsiveness may not just be associated with degraded deliberation or thoughtlessness (Type 2), but also a different Type of potentially “prudent” thinking (Type 1; Epstein, 2008, p. 33). Following CEST, these independent processes are considered

parallel-competitive; meaning that they combine to influence behavior to the degree that each processing Type is activated for a particular person in a particular context (Epstein, 2008). When there is a conflict between responses proposed by the processes, each process exerts an influence in proportion to its level of activation (Evans, 2007; Hodgkinson & Sadler-Smith, 2018). I therefore explore both processing Types and argue that Type 1 processing, emerging from hyper-activation of intuitive processing, which can stimulate hedonic impulses over and above restraint from analysis (henceforth, hedonic impulses) (Evans & Stanovich, 2013; Van Gelder, De Vries, & Van Der Pligt, 2009) has unique implications for VIQ.

To assess this broader impulse-driven panoply, I link a well-established (Sharma, Markon, & Clark, 2014) conceptualization of trait impulsivity as an umbrella construct to the dual processes. Drawing from the Five Factor Model (FFM) of personality–the predominant biologically based trait taxonomy in personality research (Digman, 1990; Obschonka & Stuetzer, 2017)–Whiteside and Lynam (2001) identified four heterogenous etiologies of 'impulsive-like behaviors' (p.685). According to them (idem), impulsive-like behaviors emerge from a tendency to (1) enjoy and engage in thrilling and potentially hazardous activities (Sensation-Seeking), (2) not think and plan ahead (Lack of Premeditation), (3) not resist distractions and persist with challenging tasks (Lack of Perseverance), or (4) experience strong negative emotions and urges to act on those emotions (Urgency).

While forming a unifying definition of trait impulsivity has proven difficult (Carver & Johnson, 2018), conceptualizing the term as an umbrella construct grounded in the FFM has facilitated the prediction of a range of impulsive manifestations and psychopathology of recent interest to entrepreneurship scholars, such as ADHD (Antshel, 2018), psychopathy (Ray, Poythress, Weir, & Rickelm, 2009), hypomania (Johnson, Carver, Mulé, & Joormann, 2013), and addiction (Mitchell & Potenza, 2014). Thus, following prior research (Carver & Johnson, 2018; Nordvall, Neely, & Jonsson, 2017; Romer, Reyna, & Pardo, 2016), I employ this multidimensional conceptualization as a useful, biologically grounded basis for understanding a broader panoply of cognitive mechanisms underpinning impulsive-driven processing and its effects on VIQ. I commence the development of my hypothesized model (refer to Figure 3.1) by theorizing the effects of the dual processes on VIQ.

3.3 HYPOTHESIS DEVELOPMENT

3.3.1 Dual impulsive processes and VIQ

Reliance on the dual processes exhibits significant within-person variability depending on individual differences, as well as task-specific characteristics, such as uncertainty (Akinci & Sadler-Smith, 2013; Dewberry, Juanchich, & Narendran, 2013; Epstein, 2003). I thus focus on the processing Types employed during the task of forming an idea which one considers worthwhile to pursue generally (third-person idea) or pursue themselves, specifically (first-person idea). Since such formation rests on one's confidence, under uncertainty, that an idea is commercially valuable (Grégoire et al., 2010), it aligns with my aim of capturing task-specific preferences for, and engagement in, processing information around what are perceived, under uncertainty, to be worthwhile venture ideas to pursue (Baldacchino, Ucbasaran, Cabantous, & Lockett, 2015; Swift & Peterson, 2019).

3.3.1.1 *Under-activated analysis: Disinhibition*

Following the predominant and largely indisputable view that rational analysis should, at least when not facing ineliminable uncertainty, increase VIQ (Rapp & Olbrich, 2020), it seems likely that under-activated analysis reduces VIQ. From a dual-processing perspective, under-activated analysis will increase the likelihood that impulses toward tempting stimuli exert an influence on overt behavior, even if such impulses are relatively weak (Hofmann, Friese, & Strack, 2009). Under-activated analytical processing could cause unrestrained reactions to a broad variety of motivational and emotional states (Carver & Johnson, 2018), such as responses to even mildly tempting venture ideas. Thus, while disinhibition may increase entrepreneurial action (Lerner, Hatak, & Rauch, 2018; Lerner, Hunt, & Dimov, 2018), I hypothesize it will hinder first-person VIQ. Disinhibited action will result in pursuit of a venture idea with limited consideration of *any* essential characteristics of that idea[1]. In practice, entrepreneurs are inundated with potential opportunity stimuli—only a few of which demonstrate any real commercial potential (Grégoire, Barr, & Shepherd, 2010). Thus, the unfettered pursuit of these stimuli with no appraisal of the problem, potential solutions, commercial prospects and feasibility, is likely to lead to low VIQ (Allen & Thomas, 2011; Hodgkinson & Healey, 2011):

H1: Heightened reliance on disinhibition decreases VIQ.

3.3.1.2 *Hyper-activated intuition: Hedonic Impulses*

Although many features of intuitive processing are epiphenomenal (e.g., fast, unconscious, biased or irrational), the distinguishing feature of this processing Type is that while analytic processing depends on working memory, intuitive processing does not (Evans & Stanovich, 2013). Rather, the visceral, hedonically-driven impulses of heightened intuitive processing are engendered autonomously (Thompson, 2013). They are spontaneously triggered responses that emerge without controlled attention (Evans & Stanovich, 2013), independent of working memory analysis and endorsement (Epstein, 2003). Thus, unlike disinhibition, hedonic impulses are not equated with shortcuts in analysis, degraded deliberation, or thoughtlessness, but a different Type of thinking, a potentially "prudent voice" (Epstein, 2008, p. 33), capable of outperforming analysis in uncertain contexts where logical deduction is less suited, and rapid action is required (Hodgkinson & Sadler-Smith, 2018).

The establishment and capture of new economic value from a high potential idea is highly competitive, often only furnishing a brief and uncertain window of opportunity (Kirzner, 1997). In this context, the autonomous pattern recognition and visceral processes central to hedonic impulses (Epstein, 2003) likely play a critical role in generating and motivating the timely pursuit of a quality venture idea (Hodgkinson & Sadler-Smith, 2018). By enabling rapid, holistic associations between seemingly unrelated components (e.g., diverse technologies, markets, business models, or policies), hedonic impulses are attuned to recognizing patterns and eliciting visceral reactions that may seem too disparate, vague and uncertain for analytical processing to detect and reasonably endorse (Dane & Pratt, 2007; Epstein, 2003). Research positively links intuitive processing to venture idea recognition (Baldacchino et al., 2015; Ravasi & Turati, 2005; Vaghely & Julien, 2010). However, I argue that by autonomously facilitating pattern recognition *and* visceral action on these recognized patterns, hedonic impulses play a role beyond idea generation to have a direct effect on the VIQ of ideas pursued:

H2: Heightened reliance on hedonic impulses increases VIQ.

3.3.2 Dual processes as mediators of the impulsivity-VIQ relationship

As broad, biologically based traits which capture diverse etiologies of 'impulsive-like behaviors' (Whiteside & Lynam, 2001)–multidimensional impulsivity provides a stable and

enduring basis (Obschonka & Stuetzer, 2017) for illustrating a broader panoply of impulsiveness and its effects on VIQ. Typically, deciding whether an idea is worthwhile to pursue brings the real potential consequences in focus (van Gelderen, Kautonen, & Fink, 2015) and encourages slow, deliberate analysis of the idea (Wood, Bakker, & Fisher, 2021). However, since a lack of premeditation predisposes one to act without reflection, planning and reasoned consideration of the consequences (Whiteside & Lynam, 2001), this impulsive predisposition likely increases reliance on disinhibition in the formation of venture ideas. Thus, rather than assessing the potential consequences and impediments to the pursuit of an uncertain idea, I posit that a lack of premeditation will encourage one to explicitly forgo or repress this planful, rule-based analytical processing (Thompson, 2013; Wardell, Quilty, & Hendershot, 2016). Since I posited negative effects of disinhibition on VIQ (H1), I hypothesize:

> *H3*: The effect of lack of premeditation on VIQ is negatively mediated by disinhibition: lack of premeditation increases reliance on disinhibition, which in turn decreases VIQ.

In contrast, hedonic impulses reflect a Type of processing that is driven by emotional and visceral sensations (both positive and negative) rather than analysis (Epstein, 2003). Thus, I hypothesize that the (a) sensation-seeking, (b) urgency and (c) lack of premeditation impulsivity traits will heighten, while (d) lack of perseverance will reduce reliance on hedonic impulses in the formation of new venture ideas. Sensation-seeking reflects an attraction to, and predisposition toward, pursuing novel, exciting, and potentially risky endeavors (Whiteside & Lynam, 2001). Thus, the uncertain and novel prospect of a new venture idea is likely to be highly exciting and hedonically arousing for these individuals, primarily eliciting reliance on these hedonic impulses in the decision to pursue venture ideas. Urgency reflects acting on strong affective impulses, typically under conditions where the individual feels threatened or anxious (Whiteside & Lynam, 2001). Thus, the uncertain and novel prospect of a new venture idea is likely to be highly emotive for these individuals, and they are likely to act on these hedonic impulses as their primary decision input (Berg, Latzman, Bliwise, & Lilienfeld, 2015; Carver, 2005). Sensation-seeking and urgency appear to be traits which are primarily driven by emotion and visceral feeling rather than any explicit repression of rule-based analytical processing (Thompson, 2013; Wardell et al., 2016)[2]. Thus, I do not

hypothesize any systematic effects of these traits on analysis. On the other hand, since individuals lacking premeditation do not require endorsement from analytical processing to act on an idea (Nordvall et al., 2017; Philippe et al., 2010), these individuals are likely sensitized to acting on what they find hedonically appealing (Zermatten, Van der Linden, d'Acremont, Jermann, & Bechara, 2005), resulting in an increased reliance on hedonic impulses in addition to their reliance on disinhibition (*H3*). Since I posited positive effects of hedonic impulses on VIQ (*H2*), I hypothesize:

> *H4*: The effect of (a) sensation-seeking, (b) urgency, (c) lack of premeditation on VIQ is positively mediated by hedonic impulses: a, b and c heighten reliance on hedonic impulses, which in turn increases VIQ.

Finally, lack of perseverance reflects an inability to remain focused on boring or challenging tasks (Whiteside & Lynam, 2001). Pursuing a venture idea is often a challenging and tedious journey (van Gelderen et al., 2015). Thus, it appears probable that in this context, lack of perseverance will reduce intuitive processing toward passivity, lethargy, and apathy regarding the challenging nature of the task (Berg et al., 2015). Although lack of perseverance could also be associated with a lack of persistent analytical processing (Berg et al., 2015), I refrain from hypothesizing any systematic effect of lack of perseverance on analysis in the formation of first-person venture ideas. Individuals lacking perseverance might be able to plan and assess an idea, yet they exhibit an apathetic Type of processing, which means they struggle to motivate themselves (Whiteside & Lynam, 2001) to follow through and act on commercially valuable ideas and place little reliance on the pattern recognition and visceral motivation of hedonic impulses that would seemingly benefit VIQ:

> *H4*: The effect of (d) lack of perseverance on VIQ is negatively mediated by hedonic impulses: d reduces reliance on hedonic impulses, which in turn decreases VIQ.

3.3.3 Moderating effect of entrepreneurial experience

As a rule-based, deductive processing approach that draws from logical inference, analytical processing is unlikely to benefit much from practical experience (Epstein, 2003; Hodgkinson et al., 2008). However, hedonic impulses depend on one's "implicit theory of reality," which is developed through experience (Epstein, 2003, p. 176). That is, experience does not

necessarily drive reliance on hedonic impulses but does determine the efficacy of the outcomes emerging from it (Epstein, 2008). Implicit frameworks, whether refined or not, are formed from experientially related events and determine what patterns intuitive processing recognizes and is viscerally driven to pursue or avoid (Hofmann et al., 2009; Pacini & Epstein, 1999).

In entrepreneurship, these implicit frameworks comprise the perceived prototypical features of a venture used to form a venture idea, with research demonstrating that these features vary significantly with entrepreneurial experience (i.e., prior experience in pursuing new venture ideas; Baron & Ensley 2006; Gruber, Kim, & Brinckmann, 2015). Unable to draw from personal entrepreneurial experience, novice entrepreneurs' prototypes are heavily influenced by the popular business press, which espouses hedonically appealing stories of novel ideas with a limited focus on their practical challenges (Baron & Shane, 2007; Baron & Ensley, 2006). As a result, novices likely form hedonic impulses toward novel yet impractical venture ideas. However, as entrepreneurial experience is gained, individuals' prototypes become increasingly sophisticated in terms of incorporating the key features related to practically starting a profitable venture (Arentz, Sautet, & Storr, 2013; Gruber et al., 2015), and they form more appropriate visceral reactions to these features (Epstein, 2003). I, therefore, hypothesize that:

> *H5*: Entrepreneurial experience positively moderates the effect of hedonic impulses on VIQ.

Given the above hypothesis that entrepreneurial experience may amplify the effect of hedonic impulses on VIQ (*H5*), it is important to understand the broader implications for my theorized model (refer to Figure 3.1). Since all four impulsive predispositions exhibit a mediated effect on VIQ through hedonic impulses (refer to *H4*), I argue that a moderated-mediation effect of the impulsive predispositions on VIQ via the second-stage of this hedonic impulses pathway is probable (Holland, Shore, & Cortina, 2017). That is, the indirect effects of the four impulsive predispositions on VIQ (i.e., impulsivity→hedonic impulses→VIQ) may be amplified by entrepreneurial experience. In the case of sensation-seeking, urgency and lack of premeditation, the positive effect on VIQ through hedonic impulses should increase with entrepreneurial experience as experience helps to direct the hedonic impulses towards

ideas of higher quality. However, in the case of lack of perseverance, which is hypothesized to reduce reliance on hedonic impulses, the negative effect on VIQ should increase. In either case, the mediated effect is positively moderated, leading to the following hypothesis:

> *H6*: The mediated effect of (a) sensation-seeking, (b) urgency, (c) lack of premeditation and (d) lack of perseverance on VIQ through hedonic impulses is positively moderated by entrepreneurial experience.

3.4 STUDY 1: RESEARCH METHODS

3.4.1 Sample and procedure

I employed a prospective design (Spector, 2019) by collecting two rounds of survey data (12 months apart) from individuals who own and manage a venture in South Africa. The final sample comprised owner-managers who, in Round 2, reported acting on a new venture idea in the last 12 months. This sample captured VIQ among individuals in the nascent pursuit of an idea, thus reducing heterogeneity and retrospective bias (Davidsson, 2015). Furthermore, owner-managers are unlikely to be pushed into subsequent entrepreneurial pursuits (Dawson & Henley, 2012), thus avoiding confounding effects of an impulsive personality being forced into the pursuit (Antshel, 2018). A random sampling frame of 20 000 individuals from the target population was acquired from a firm specializing in capturing and maintaining of local business records. The frame was stratified according to country-wide industrial, provincial (Bureau for Economic Research, 2016), and gender (Herrington, Kew, & Mwanga, 2017) distributions among formally registered firms. Data were collected from the owner-managers via an online survey. To limit endogeneity threats, I captured the dual processes and VIQ in Round 2. In Round 1, 842 responses were collected (4.21% response-rate), with 807 usable responses. In Round 2, 243 usable responses were collected (30.11% response-rate), with 228 reporting acting on a new idea in the last 12 months[3]. Owner-manager experience ranged from under five years (11.2%) to just over 30 years (13.5%; median=15 years; SD=10.30 years), the mean age was 54.16 years (SD=11.56), and 32.6% were female. Education varied from postgraduate (46.5%), to undergraduate (18.7%), trade/vocational training (21.3%), and secondary school (11.7%) levels.

3.4.2 Measures

Trait Impulsivity (Round 1) was captured as a general predisposition toward impulsiveness in daily life using the validated (Whiteside, Lynam, Miller, & Reynolds, 2005), 45-item Urgency, Premeditation, Perseverance, Sensation-seeking (UPPS) Impulsivity Scale. This scale captured the four traits (10-12 items per trait) on a 4-point Likert scale, ranging from 1 (strongly disagree) to 4 (strongly agree) (Whiteside & Lynam, 2001). Respective example items for Urgency, Premeditation, Perseverance, Sensation-seeking are “When I am upset I often act without thinking,” “I usually think carefully before doing anything,” “I generally like to see things through to the end,” and “I would enjoy skydiving.”

Disinhibition and Hedonic Impulses (Round 2) was captured using the validated (Hodgkinson, Sadler-Smith, Sinclair, & Ashkanasy, 2009), 24-item Rational-Experiential Inventory (REI-24) (14 and 10 items respectively) on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) (Pacini & Epstein, 1999). I contextualized each item to ensure its relevance to first-person ideas (Swift & Peterson, 2019) by asking respondents to rate the degree to which the items represent their decision-making in their entrepreneurial pursuit. This contextualization generates a role-specific measure of processing engagement (Bing, Davison, & Smothers, 2014; Swift & Peterson, 2019). Respective example items for disinhibition and hedonic impulses are “I am not a very analytical thinker when pursuing a business opportunity,” and “I like to rely on my intuitive impressions when pursuing a business opportunity.”

VIQ (Round 2) was captured using the validated (Santos et al., 2015), 15-item (5 items per dimension), 7-point Likert scale from Baron and Ensley (2006). Respondents rated the extent to which the prototypical venture idea features are characteristic of their idea, ranging from 1 (Not at all like it) to 7 (Very much like it). Respective example items for novelty, need and financial model are “The business opportunity is unique,” “It has a large market,” and “It has a favorable financial model.”

Although Baron and Ensley (2006), as well as Santos et al. (2015), undertook substantive effort towards validating the idea scale, researchers should continually seek evidence to

assess construct validity–whether a measure does indeed capture the properties of the intended construct (Carlson & Herdman 2012). In this regard, two points are noteworthy. First, self-report performance measures, such as VIQ, are subject to social desirability bias (Podsakoff, MacKenzie, & Podsakoff, 2012). Self-reports are common when capturing idea novelty and it is generally observed that individuals overestimate the novelty of their ideas (Dahlqvist & Wiklund, 2012). However, to the extent that respondents exaggerate VIQ equally, the VIQ measure, and its associated nomological web of relationships, should remain valid (Davidsson, 2018). In addition, I control for social desirability bias to further limit this threat to construct validity (refer to controls section below).

Second, the construct validity of a superordinate construct requires evidence of reasonably strong factor loadings of each dimension (i.e., novelty, need and financial model) onto the intended superordinate construct (i.e., VIQ), as well as evidence that the superordinate construct exhibits the predicted relationships with other theoretically related constructs (Edwards, 2001). Confirmatory factor analysis (CFA) provides evidence of the former for the VIQ construct (refer to section 3.5: Study 1 Results). In terms of the latter, Study 1 begins to illustrate how impulsivity and the dual processes predict VIQ as expected (refer to section 3.5: Study 1 Results). As an additional assessment of whether the superordinate VIQ construct exhibits relationships with other constructs which have been theorized as related, I further investigate whether self-reported VIQ relates to a more objective performance outcome of pursuing high VIQ ideas. To the extent that an individual pursues high VIQ ideas, this should be partly reflected in the ratio of successful to unsuccessful product/service commercialization attempts. That is, individuals who pursue high VIQ ideas likely exhibit a higher ratio of idea pursuit successes to failures over time (Deligianni, Voudouris, Spanos, & Lioukas, 2019), given that success or failure of a venture start-up attempt centers, in part, around the quality of the venture idea pursued (Baron & Ensley, 2006). Indeed, I found this more objective ratio positively related to the VIQ measure (r_S=0.138, $p<0.05$). While this correlation may be considered small, I argue that it is still meaningful, and the small correlation may be reflective of the following. (1) The two measures capture distinct but theoretically related constructs and thus are not expected to be highly correlated, but rather positively relate to some degree (Deligianni et al., 2019). (2) Relative to the commercial potential of ideas currently pursued (VIQ), the ratio of actual commercialization successes

to failures over time is more directly subject to variations in economic stability and resources which may limit the size of the correlation. (3) The ratio measure depends more directly on respondents' retrospective judgements and the number of commercialization attempts made over time compared to VIQ of a currently pursued idea which disregards the past to focus on a single present idea. As a result, the ratio measure will capture additional variation from the past not captured by VIQ. Despite these negating factors, a significant positive correlation is still observed. Therefore, the cumulative evidence provides reasonable confidence that the VIQ measure meaningfully relates to theoretically related constructs and captures the intended construct (Edwards, 2001).

Entrepreneurial Experience (Round 2) was captured using four items. Two items captured respondents' level of experience in "establishing new businesses" and "being part of a new business start-up" (Zhao, Seibert, & Hills, 2005), while two items captured experience in "developing new services or processes" and "developing new products" (Jensen & Clausen, 2017), ranging from 1 (very low) to 5 (Very high).

Controls. I controlled[4] for social desirability bias (SDB) using a 10-item scale (α=0.62) (Fischer & Fick, 1993) since SDB may confound performance outcome measures (Podsakoff et al., 2012), such as VIQ. (1) The extent to which the venture idea decision is solely vested in the entrepreneur or decentralized, (2) resource munificence, and (3) entrepreneurial motivation likely impact VIQ (Davidsson, 2015; Wood, McKelvie, & Haynie, 2014). Thus, I included a five-item entrepreneurial decision-making decentralization scale (α=0.91) (Lyngsie & Foss, 2017), respondents' number of employees as a proxy for resource munificence (Deligianni et al., 2019)[5], and a 3-item perceived desirability scale (α=0.63) (Krueger, 1993). Moreover, I included an item capturing the perceived stage of venture idea development (van Gelderen, Kautonen, Wincent, & Biniari, 2018) since it should impact VIQ (Baron & Ensley, 2006). Finally, I controlled for age, education, and gender, all of which have been shown to impact opportunity recognition (DeTienne & Chandler, 2007; Ucbasaran, Westhead, & Wright, 2008). Following prior work (Larson, 2019; Lyngsie & Foss, 2017; Peterman & Kennedy, 2003), all multi-item scales were constructed as composite averages to meet SEM sample size requirements and maintain sufficient statistical power.

3.5 STUDY 1: RESULTS

The latent moderated structural equations (LMS) approach (Klein & Moosbrugger, 2000) was employed in Mplus (version 8.4) to estimate the model. Confirmatory factor analysis (CFA) was conducted to evaluate measurement model fit (Anderson & Gerbing, 1988). I removed 11 items with loadings below 0.6 to improve model fit (4 for sensation-seeking, 3 for urgency, and 1 item each for lack of perseverance, hedonic impulses, disinhibition and experience) (Anderson & Gerbing, 1988). All VIQ dimensions loaded strongly onto the superordinate construct (Unmet need=0.850, $p<0.005$; Novelty=0.689, $p<0.005$; Financial Model=0.590, $p<0.005$), suggesting its full meaning was adequately captured (Edwards, 2001). The final model showed acceptable fit[6] (x^2/DF=4133.787/2578=1.6, RMSEA=0.051, and SRMR=0.068) (Anderson & Gerbing, 1988). Table 3.1 presents descriptive and discriminant validity statistics for substantive model factors. All composite reliability (CR) and Cronbach's coefficients exceeded recommended thresholds (>0.7; Nunnally, 1978). Each latent variable's square root of the Average Variance Extracted (AVE) exceeded correlations with other model variables, suggesting acceptable discriminant validity (Fornell & Larcker, 1981).

Table 3.1: Descriptive and validity statistics

	CR	M	SD	1	2	3	4	5	6	7	8	9	10	
1. Sensation-seeking	0.844	2.66	0.54	*0.620*										
2 Lack of premeditation	0.899	2.02	0.49	0.154*	*0.670*									
3. Lack of perseverance	0.846	1.75	0.42	-0.055	0.236**	*0.643*								
4. Urgency	0.905	2.00	0.53	0.130†	0.366**	0.237**	*0.720*							
5. Disinhibition	0.826	1.92	0.53	-0.135*	0.137*	0.058	0.161*	*0.613*						
6. Hedonic impulses	0.908	3.40	0.65	-0.006	0.204*	-0.158*	0.186**	0.034	*0.661*					
7. Novelty	0.907	5.04	1.53	-0.001	0.088	-0.026	-0.115	-0.070	0.184**	*0.815*				
8. Unmet need	0.747	4.90	1.24	0.029	-0.054	-0.050	-0.152*	-0.080	0.071	0.508**	*0.704*			
9. Financial model	0.841	5.23	1.17	0.117	-0.145*	-0.054	-0.054	-0.226**	0.068	0.339**	0.508**	*0.723*		
10. VIQ	0.759	5.02	1.10	0.045	-0.012	-0.051	-0.128^	-0.132†	0.144*	0.589**	0.884**	0.670**	*0.730*	
11. Experience	0.877	3.70	0.850	0.121^	0.067	0.208**	-0.165*	-0.261**	0.198**	0.159*	0.192**	0.278**	0.234**	*0.843*

^p<0.1; *p<0.05; **p<0.01 (2-tailed)

Notes: n=228; CR=Composite Reliability; M=mean; SD=standard deviation; Italicized diagonal values=square root of the AVE.

LMS does not estimate global fit. I thus compared several nested models (refer to Table 3.2), excluding the interaction term, using maximum likelihood, and thereafter compared change in model fit following addition of the interaction term in LMS (Sardeshmukh & Vandenberg, 2017). Since other mediators may explain the effects of impulsivity (e.g., push factors) on VIQ, I hypothesized a partial mediation model (Model 1; Figure 3.2). Model 1 indicated an acceptable fit to the data (x^2/DF=1.565, RMSEA=0.053, SRMR=0.078). Chi-square difference tests showed that Model 1 fit the data significantly better than Models 5-7, ruling out these alternatives as better explanations for the data. As global fit was similar for Models 1-4, I assessed explained variance in VIQ (Weston & Gore, 2006). Model 1 explained the most variance (26.1%), thus being retained for further analyses.

Table 3.2: Nested model comparison

Model	χ^2	df	*SRMR*	RMSEA	$\Delta\chi^2$	Δdf
1	5134.532	3279	0.078	0.053	–	–
2	5137.356	3283	0.079	0.053	2.824	4
3	5139.240	3284	0.079	0.053	4.708	5
4	5128.303	3282	0.078	0.053	6.229	3
5	5179.377	3291	0.090	0.054	44.845***	12
6	5191.526	3290	0.089	0.054	56.994***	11
7	5242.230	3273	0.077	0.051	107.698***	6

Notes: *p<0.05; **p<0.01; ***p<0.005

Model 1: Partial mediation model.

Model 2: Full mediation model.

Model 3: Entrepreneurial experience (EE) as a mediator.

Model 4: EE as a predictor (EE→dual processes→VIQ; impulsivity→dual processes→VIQ).

Model 5: First-stage effect (impulsivity→dual processes) constrained to zero.

Model 6: Alternative causal path model (dual processes→impulsivity→VIQ).

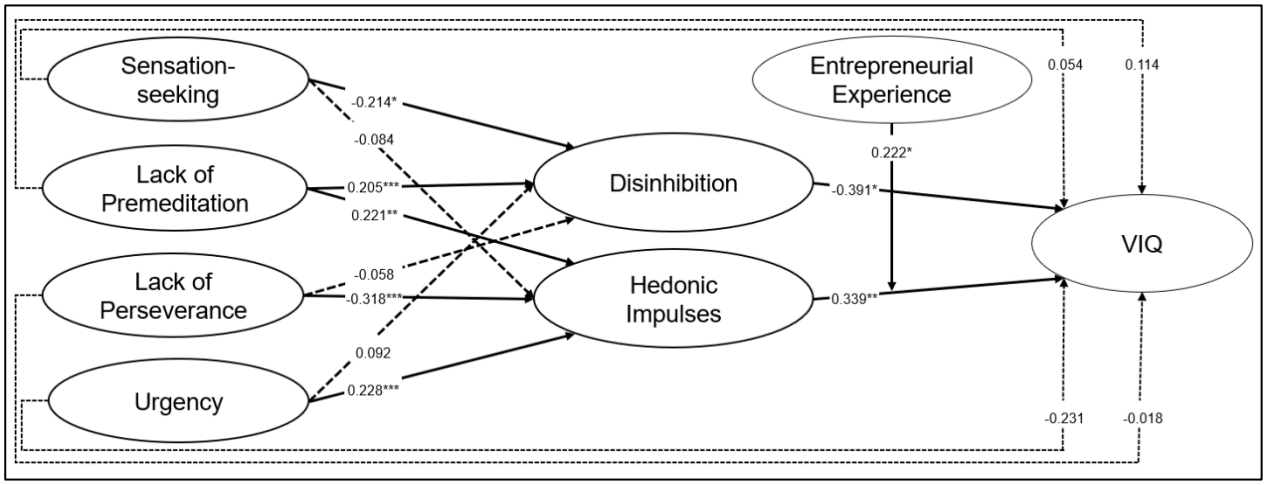
Model 7: Partial mediation model, VIQ as set of dimensions (not superordinate construct).

Adding the entrepreneurial experience-hedonic impulses latent interaction term marginally improved model fit compared to Model 1 (log-likelihood ratio test=2.954, p=0.086), indicating acceptable model fit (Maslowsky, Jager, & Hemken, 2015). Results (summarized in Figure 3.2) support *H1* and *H2*, disinhibition negatively (β=-0.391, p<0.05), while hedonic impulses positively (β=0.339, p<0.005), impacted VIQ. Thus, even while controlling for the impact of disinhibition (analysis), hedonic impulses still plays a significant independent role in explaining VIQ-suggesting the dual processes can fruitfully be considered in parallel. Supporting *H5*, entrepreneurial experience positively moderated the hedonic impulses-VIQ

pathway (β=0.222, p<0.05). To avoid sampling distribution assumptions, I used 2000 bootstrap samples to generate 95% bias-corrected confidence intervals for all mediation and moderated-mediation effect estimates (Hayes & Rockwood, 2020). Moderated-mediation hypotheses (*H6a-d*) were tested using the index of moderated-mediation (IMM) as it assesses moderation throughout the range of moderator values (Hayes, 2015).

Lack of premeditation increased disinhibition (β=0.205, p<0.005), yielding a negative mediated effect on VIQ (β=-0.049; CI=-0.127, -0.010), supporting *H3*. Contrary to *H4a* and *H6a*, sensation-seeking had a nonsignificant effect on hedonic impulses (p=0.381), yielding a nonsignificant effect on VIQ via this pathway and a nonsignificant IMM (β=-0.019; CI=-0.084, 0.024). However, sensation-seeking had a negative effect on disinhibition (β=-0.214, p<0.05), yielding a positive mediated effect on VIQ (β=0.051; CI=0.012, 0.145). Supporting *H4b* and *H6b*, urgency increased hedonic impulses (β=0.228, p<0.005), translating into a positive mediated effect on VIQ (β=0.047; CI=0.017, 0.115), which was positively moderated by experience (IMM=0.051; CI=0.004, 0.120). Supporting *H4c* and *H6c*, lack of premeditation increased hedonic impulses (β=0.221, p<0.01), yielding a positive mediated effect on VIQ (β=0.045, CI=0.028 to 0.128) which was positively moderated by experience (IMM=0.049; CI=0.004, 0.139). Supporting *H4d* and *H6d*, lack of perseverance decreased hedonic impulses (β=-0.318, p<0.005), yielding a negative mediated effect on VIQ (β=-0.065; CI=-0.121, -0.026), which was positively moderated by experience (IMM=0.051; CI=0.004, 0.120). Further probing mediated effects at low, mean, and high (1, 0, and -1 SDs from the mean) entrepreneurial experience using the aforementioned bootstrap procedure revealed that trait impulsivity only increased VIQ via hedonic impulses when experience was moderate to high.

Figure 3.2: Structural model results



Controlled paths	β
SDB→VIQ	0.194*
Perceived stage of venture idea→VIQ	0.068
Entrepreneurial decision-making decentralization→VIQ	0.273***
Number of employees→VIQ	0.150^
Perceived desirability→VIQ	0.087
Age→VIQ	0.175
Gender→VIQ	0.068
Education→VIQ	-0.099

Notes: ^p<0.1; *p<0.05; **p<0.01; ***p<0.005; β=Standardized coefficients, estimated by standardizing data prior to analyses (Klein & Moosbrugger, 2000; Maslowsky et al., 2015). Dashed paths are nonsignificant.

3.5.1 Robustness tests

Additional robustness analyses were conducted. First, since the sample size was on the lower bounds for SEM (Westland, 2010), I validated the hypotheses with SPSS PROCESS (Preacher & Hayes, 2008). Each mediated and moderated-mediated effect was tested piecewise. All 8 models produced the same inferences, supporting the robustness of my main analyses. Second, I tested quadratic hedonic impulses and entrepreneurial experience terms and a disinhibition-hedonic impulses interaction term. No term was significant (p>0.05), ruling out these explanations for the data (Hayes & Rockwood, 2020). Third, since items were removed from the UPPS impulsivity factors, I followed Wiklund et al. (2017) and re-assessed the model using the 16-item short UPPS scale (Cyders, Littlefield, Coffey, & Karyadi, 2014). Measurement model fit, reliability, validity, and structural paths were largely analogous to the reported results, indicating the results are reasonably robust to variations in the measurement of impulsivity. However, one non-hypothesized path did change (refer to Appendix H). The lack of perseverance-disinhibition path became negative and significant (β=-0.221, p=0.032). This may be because the short form scale tends to more precisely

focus on the inability to see plans through rather than an inability to plan (Cyders et al., 2014).

Fourth, given similarities between trait impulsivity and the dual processes, I assessed the trait impulsivity-dual-process pathways for endogeneity using instrumental variable (IV) estimation (Antonakis et al., 2010). Age (Steinberg et al., 2008) and gender (Berg et al., 2015) underlie biological differences in trait impulsivity and likely only impact dual-processing during venture idea formation through these basic biologically based traits. Thus, I assessed these theoretically relevant and exogenous IVs piecewise in separate models for each impulsivity-dual-process pathway. While tests indicated that the IVs were not effective for urgency, they were deemed effective for the remaining impulsivity traits, which were thus examined further. Endogeneity tests[7] indicated the effects of these three traits on the dual processes is not due to endogeneity (e.g., CMV and simultaneity; Antonakis et al., 2010). This analysis, in conjunction with the nested model comparison, indicates the dual processes are important mechanisms explaining the impact of impulsivity traits in the venture idea pursuit context. I thus conducted a more controlled experiment to strengthen the understanding of the causal effect of these mechanisms on VIQ (*H1 and H2*).

3.6 STUDY 2: RESEARCH METHODS

3.6.1 Participants and procedure

I recruited Amazon Mechanical Turk (MTurk) participants, a data source with demonstrable validity and reliability in entrepreneurship research (Allison, Davis, Webb, & Short, 2017; Frederiks et al., 2019). This sample was suitable for two reasons: (1) All individuals engaging in the world encounter various opportunity stimuli or external enablers (EEs; Davidsson, 2015). Although many factors influence first-person idea formation, CEST suggests that processing of these EEs and formation of an idea around them must be, in part, a function of the dual reasoning process tenets which all individuals rely on (Epstein, 2003). Thus, the model, grounded in a broad theory of the reasoning processes underlying VIQ, should universally apply to individuals and their ideas (Grégoire, Binder, & Rauch, 2019; Hsu, Simmons, & Wieland, 2017). (2) I sought a sample varying in entrepreneurial (start-up) experience to test moderating effects–a characteristic found in MTurk samples (Aguinis & Lawal, 2012). I restricted participation to U.S.-based individuals who completed at least 5000

MTurk tasks and responded satisfactorily at least 98% of the time (Aguinis & Bradley, 2014). I only included participants who answered all questions and correctly answered four attention checks (Abbey & Meloy, 2017), resulting in the removal of 185 participants and a final sample of 164 participants (41 participants per condition on average).[8] The final sample was 38.8 years-old on average (SD=10.6); 56% were female. Consistent with my sampling goal, 55.3% of participants had not started a business, 32% had started one, and 10.1% had started two or more businesses (refer to Table 3.3).

The experiment was administered online and comprised two stages: a priming stage (Janiszewski & Wyer, 2014) and an ostensibly unrelated venture idea task stage. Respondents were randomly assigned to experimental conditions and asked to complete the experiment on their own, with no distractions. I included a control condition and an analytical reference group to enhance confidence in my findings, resulting in a 4-group (disinhibition, analysis, hedonic impulses, control) between-subjects design.[9]

Table 3.3: Descriptive and validity statistics

	M	SD	1	2	3	4	5	6	7	8	9	10
1. Age	38.80	10.59	*1*									
2 Education	2.02	0.49	0.121^	*1*								
3. No. of businesses started	0.64	0.92	0.209**	0.144*	*1*							
4. Prior knowledge of technology	3.03	1.66	-0.078	0.052	0.274**	*1*						
5. Work experience (years)	16.71	10.32	0.859**	-0.017	0.152*	-0.109	*1*					
6. Entrepreneurial preference	2.95	1.14	-0.047	0.127^	0.386**	0.412**	-0.052	*1*				
7. Entrepreneurial experience	2.71	1.67	0.091	0.188**	0.686**	0.459**	0.026	0.595**	1			
8. Novelty	2.93	1.04	0.035	0.024	-0.065	-0.010	0.073	-0.077	-0.091	1		
9. Unmet need	3.88	0.91	-0.092	-0.096	-0.213**	-0.172*	0.012	-0.112	-0.235**	0.389**	1	
10. Financial model	3.77	1.16	0.066	-0.094	-0.152*	-0.136	0.156*	-0.186**	-0.247**	0.353**	0.804**	1
11. VIQ	3.53	0.85	0.012	-0.067	-0.171*	-0.127^	0.104	-0.156*	-0.233**	0.704**	0.879**	0.884**

^p<0.1; *p<0.05; **p<0.01 (2-tailed)

Notes: n=164

3.6.2 Stage 1: Treatments

In the hedonic impulses condition, participants answered five questions requiring examination and reporting of their feelings about certain words (e.g., ocean) (Hsee & Rottenstreich, 2004), which primes access to hedonic impulses (Kvaran, Nichols, & Sanfey, 2013; Liu & Onculer, 2017). In the disinhibition condition, participants were instructed to generate their idea as quickly as possible and were given a time limit (although not enforced) and screen countdown (2 minutes to articulate an idea, 30 seconds to act on the idea, and 5 minutes to further describe idea). Since time constraints limit available cognitive resources and working memory capacity for analytical processing, it should increase disinhibition without contamination from hedonic impulses (Cone & Rand, 2014; Hofmann et al., 2009). Following van den Bos, Müller, and van Bussel (2009), both the control and disinhibition conditions answered three questions related to describing "a normal day in their lives." This ensured consistency in duration and cognitive effort between groups without priming them in any way (van den Bos et al., 2009). To the extent that significant time pressure and rapid decision-making is commonly present in entrepreneurial settings (Grégoire et al., 2019), particularly among individuals who are acting impulsively (Lerner, Hunt, & Dimov, 2018), the disinhibition manipulation should remain ecologically valid. Nevertheless, I also included an analytical condition as a reference group. In this condition, participants answered five questions requiring analytical working memory, following Hsee and Rottenstreich (2004). An example question is "If a consumer bought 30 books for $540, then, by your calculations, on average, how much did the consumer pay for each book?"; which should heighten analysis (i.e., lower disinhibition) (Kvaran et al., 2013; Liu & Onculer, 2017).

3.6.3 Stage 2: Experimental task

I presented participants with a description of a new video recognition technology (Gish, Wagner, Grégoire, & Barnes, 2019). New technologies are an EE of venture ideas (von Briel, Davidsson, & Recker, 2018) and provide a heterogeneity-reducing context for assessing the actor-venture idea nexus (Davidsson, 2015). In terms of ecological validity, I employed this EE for three reasons: (1) It is an EE most individuals would understand (Gish et al., 2019), enabling fair VIQ assessment (Amabile, 1982); (2) The EE enables a variety of venture ideas, some more obvious and less intensive (e.g., licensing out the technology), others more uncertain and novel, thus enabling greater VIQ scope (Davidsson, Recker, & von Briel, 2020); (3) The EE has reasonable indeterminateness regarding chances of

success, thus ensuring congruence with the entrepreneurial domain (Grégoire et al., 2019). Since asking respondents to immediately form first-person ideas would threaten ecological validity (Williams, Wood, Mitchell, & Urbig, 2019) and risk introducing personal evaluations of one's capabilities and entrepreneurial motivation (Davidsson, 2015), I specifically asked participants to form high-quality, third-person ideas, which generate revenues and a profit. By capturing third-person VIQ (i.e., an idea perceived to be commercially valuable for someone, not the participant, specifically; McMullen & Shepherd, 2006), I assessed ideas, which, despite the uncertainty, one believes to be commercially valuable (Shepherd et al., 2007). I next captured the likelihood of acting on this ostensibly "worthwhile" idea, a first-person determination (Grégoire et al., 2010). I adapted a three-item scale by Wood, Williams, and Drover (2017) and controlled for heterogeneous resource positions and economic contexts (Davidsson, 2015). Specifically, I asked participants how likely they were to make an initial attempt at launching a business around their idea to commercialize the EE, assuming (1) economic stability (Davidsson et al., 2018) and (2) sufficient resources to purchase the EE patent and attempt to launch their idea (Wood et al., 2017). Finally, I asked 11 clarification questions using the business model canvas (Osterwalder & Pigneur, 2010) to gain a more detailed understanding of the idea (Frederiks et al., 2019).

3.6.4 Dependent variable coding

VIQ was assessed using the established (Zhou, Wang, Bavato, Tasselli, & Wu, 2019) consensual assessment technique, which posits an idea is of high-quality if appropriately experienced observers independently agree it is (Amabile, 1982). I used two independent raters with VIQ assessment experience in various sectors. Each rater successfully founded at least two ventures, has been substantially involved in business incubation programs, and actively participated in nascent-stage venture idea investment. Using the VIQ scale from Study 1 (Baron & Ensley, 2006), raters assessed VIQ within the scope of the EE presented and relative to other participants' ideas rather than against some absolute standard (Amabile, 1982). Ideas were randomly presented to limit the risk of inter-rater agreement being a method artifact (Amabile, 1982). Following Woehr, Loignon, Schmidt, Loughry, and Ohland (2015), inter-rater agreement[10] and inter-rater reliability, respectively based on mean standardized r_{wg} values and intra-class correlation coefficients (ICC), were acceptable (novelty ICC=0.68, r_{wg}=0.61; unmet need ICC=0.62, r_{wg}=0.67; financial model ICC=0.708,

r_{wg}=0.55; VIQ ICC=0.70, r_{wg}=0.78). VIQ was computed as the mean of raters' scores on the VIQ dimensions.

3.7 STUDY 2: RESULTS

I first employed two manipulation checks to assess the efficacy of the manipulations: (1) I captured (post-experiment) participants' dual-processing during the idea task via a contextualized REI-10 (Epstein et al., 1996). (2) To overcome possible *post-hoc* rationalization of one's processing (Epstein, 2003), I used a direct behavioral measure in the form of decision duration (Hauser, Ellsworth, & Gonzalez, 2018). Faster decisions are a key indicator of less Type 2 reasoning (Hofmann et al., 2009). Thus, I captured the mean duration taken to formulate, decide to act on, and clarify one's idea as a direct behavioral measure of the reasoning Type employed by participants during the experimental task. I conducted four one-way between-subjects analyses of variance (ANOVA) to compare conditions (refer to Table 3.4). Tukey's HSD test for post-hoc analyses revealed higher scores on the respective manipulation checks for each treatment compared to the control. For example, the disinhibition condition scored significantly higher on both the REI-10 disinhibition measure, as well as the direct behavioral measure, relative to the control (indicated by asterisks). Similarly, the analysis condition scored significantly lower on the REI-10 disinhibition measure, and the hedonic impulses condition scored significantly higher on the REI-10 hedonic impulses measure, relative to the control (indicated by asterisks). Furthermore, as shown by the superscript letters in Table 3.4, the conditions differed significantly from each other on the manipulation checks. To illustrate, the analysis condition scored significantly lower on the REI-10 disinhibition measure and higher on the idea task time measure (i.e., more analysis), relative to the disinhibition (indicated by superscript "a") and hedonic impulses (indicated by superscript "b") conditions. However, a few differences were non-significant. In particular, the disinhibition (hedonic impulses) condition indicated no significant differences in hedonic impulses (disinhibition) relative to the control. These results support the parallel-competitive stance of CEST (Epstein, 2003) and this paper, which argues that the dual pathways are orthogonal (Carver, 2005). Overall, these results indicate successful manipulation of the desired disinhibition, analysis, and hedonic impulses theoretical constructs as captured by participants' naïve interpretation of their decision-making during the experimental task using the REI-10, and partly by participants' behavior.

Table 3.4: Manipulation checks

Group	Disinhibition		Analysis		Hedonic impulses		Control	
Measure	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Disinhibition	2.377**[a]	0.440	1.454*[ab]	0.340	1.977[b]	0.812	1.893	0.621
Idea task time (minutes)†	8.733**[ac]	3.633	20.070[ab]	18.430	12.023[bc]	4.600	14.769	7.917
Hedonic impulses	3.057[c]	0.850	3.341	1.058	3.767*[c]	0.488	3.141	0.865

Notes: *p<0.05; **p<0.01=significance of difference from control; Means with the same superscript letter differ significantly from each other (p<0.05). †Greater values of idea task time (minutes) reflect higher Type 2 analysis, while lower values reflect lower Type 2 analysis (i.e., increased disinhibition).

Second, ANOVA revealed no significant between-group differences in age, education level, work experience, entrepreneurial experience, prior knowledge of the EE, or entrepreneurial preference (captured before the manipulations) (Zhao et al., 2005), suggesting random assignment was successful. Since random assignment negates the need for controls (Hsu et al., 2019), I next conducted four one-way between-subjects ANOVA tests (refer to Table 3.5) to test *H1* and *H2*. Tukey's HSD test for post-hoc analyses indicated that compared to the control, disinhibition lowered VIQ (M=3.02, p<0.05), supporting *H1*. Further, hedonic impulses significantly enhanced VIQ (M=4.01, p<0.05), relative to the control (M=3.51), supporting *H2*. Thereafter, I assessed participants' action likelihood (Table 3.5). No significant between-group differences were observed. Since the pursuit of a quality venture idea, as a prerequisite, requires identification of a quality idea for someone (i.e., third-person idea; McMullen & Shepherd, 2006), this result suggests that the dual-processing effects on VIQ are attributable to agents' confidence in the general idea as a basis for venturing rather than confidence in their specific knowledge or perceived agent-entrepreneurship fit for that idea (Grégoire et al., 2010). Furthermore, this result aligns with recent meta-analytic evidence suggesting that third-person venture beliefs regarding a new venture idea strongly drive first-person beliefs regarding one's potential for personal gain from that idea, regardless of concerns over possible personal losses or feasibility (Canavati, Libaers, Wang, Hooshangi, & Sarooghi, 2021).

Finally, I assessed mean differences in the VIQ dimensions separately. Disinhibition significantly lowered financial favorability (M=2.95; p<0.01) relative to the control (M=3.85) and significantly lowered novelty (M=2.57; p<0.001), relative to the hedonic impulses group. Hedonic impulses significantly increased novelty (M=3.87; p<0.01) relative to the control

(M=2.88) while maintaining a more favorable financial model (M=4.04; p<0.001) than the disinhibition group (M=2.95).

Table 3.5: Mean group differences in VIQ and action likelihood

Group	Disinhibition		Analysis		Hedonic impulses		Control	
Dimension	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Novelty	2.57[b]	0.93	2.70[a]	0.80	3.87**[ab]	1.09	2.88	0.87
Unmet need	3.55[cd]	0.87	4.34*[d]	0.93	4.12[c]	0.72	3.80	0.85
Financial model	2.95**[eg]	1.03	4.78**[fg]	0.99	4.04[ef]	0.98	3.85	0.88
VIQ	3.02*[hi]	0.78	3.94^[i]	0.71	4.01*[h]	0.81	3.51	0.68
Action likelihood	3.96†	0.24	4.90 †	0.24	4.59	0.25	4.23	0.25

Notes: ^p<0.1; *p<0.05; **p<0.01=significance of difference from control; Means with the same superscript letter differ significantly from each other (p<0.05); †=means significantly different at p<0.1

To examine moderating hypothesis, *H5*, I performed linear regression using PROCESS (refer to Table 3.6) (Preacher & Hayes, 2008). Since entrepreneurial experience was not manipulated, I included the following controls which may confound the experience-VIQ relationship: baseline entrepreneurial interest, captured *before* the manipulations (Zhao et al., 2005), entrepreneurship education (Costa, Santos, Wach, & Caetano, 2018), occupational variety (Åstebro & Yong, 2016), length of work experience (Grégoire & Shepherd, 2012), prior knowledge of the EE (Wood et al., 2017), and verbosity (number of characters used for in idea task; Gish et al., 2019). I regressed VIQ on dummy variables reflecting the dual-process conditions and on a hedonic impulses-entrepreneurial experience interaction, using the entrepreneurial experience scale from Study 1. The interaction term was marginally significant and positive (β=0.121; p=0.089), thus marginally supporting *H5*.

Table 3.6: Regression results for moderating hypothesis

Predictor	*VIQ*
Entrepreneurial Preference	0.028
Entrepreneurship Education	-0.394^
Verbosity	0.004**
Prior Knowledge of Technology	-0.004
Work experience	0.009
No. of occupational fields	-0.0459^
Control condition	0.449**
Hedonic Impulses condition	0.410^
Analysis condition	0.740***
Disinhibition condition	-0.049
Entrepreneurial Experience	-0.0525
Hedonic Impulses condition X Entrepreneurial Experience	0.121^
R^2	0.294***

Notes: ^p<0.1; *p<0.05; **p<0.01; ***p<0.005; Values shown as unstandardized coefficients.

3.8 DISCUSSION

This paper developed, and across two studies, tested a dual-process model explaining the effects of impulsivity on VIQ. Study 1 established external validity for the theorized model: impulsiveness manifests through dual processes, each with distinct effects on VIQ. Given these distinct impulsive pathways, internal validity of their effect on VIQ was established by the more controlled experiment (Study 2). Lack of premeditation and urgency predicted reliance on disinhibition and hedonic impulses in venture idea pursuit 12 months later (Study 1). Disinhibition and hedonic impulses exhibited negative and positive effects on VIQ, respectively (Study 1 and 2), and these dual processes mediated the indirect effects of lack of premeditation, lack of perseverance, and urgency on VIQ (Study 1). Thus, models of entrepreneurs' decision efficacy can be enhanced by linking trait impulsivity to the dual processes. While disinhibition hinders VIQ by impelling idea pursuit with limited consideration of *any* essential characteristics of that idea, hedonic impulses, independent of analysis, increases VIQ. Hedonic impulses appear to provide an explanation for the impact of trait impulsivity on first-person VIQ that would otherwise be lacking if a unidimensional, disinhibited perspective were taken. Overall, these findings indicate that hedonic impulses is an important processing Type which meaningfully explains VIQ over and above analysis as the predominantly investigated processing Type to date (Rapp & Olbrich, 2020).

Interestingly, I also show that urgency and lack of perseverance increase and decrease reliance on hedonic impulses in the formation of new venture ideas, respectively. Although

research suggests that these traits encourage more restrained entrepreneurial behavior in a way that conforms with the precepts of utility maximization (Pietersen & Botha, 2021), I directly show that this is not due to heightened analysis but rather due to the unique intuitive processing effects[11]. Thus, following research showing that in certain cases, intuitive processing can conform to logical responding (Bago & De Neys, 2017), individuals high on these traits are not going through the complex decision-calculus of Type 2 analysis but simply autonomously respond in a manner that might lead to restrained entrepreneurial behavior but have distinct effects on VIQ. This is noteworthy, as while the descriptive account of the behavior is the same, I show that intuitive processing remains a different Type of thinking with distinct implications for VIQ.

Unexpectedly, sensation-seeking had a non-significant effect on hedonic impulses yet significantly decreased disinhibition. While the other three UPPS dimensions tend to more consistently predict impulsiveness, sensation-seeking has previously shown mixed results (Gay, Rochat, Billieux, d'Acremont, & Van der Linden, 2008; Nordvall et al., 2017), possibly since impulsive behaviors from the trait peak in adolescence and decline thereafter (Duckworth & Kern, 2011). While I controlled for age, my sample was relatively older, possibly explaining this result.

Additionally, regardless of whether hedonic impulses, disinhibition, or analysis are used, the individual's reported future action likelihood on the idea remains similar (Study 2). This observation suggests that logical actors have no problem taking entrepreneurial action relative to impulsive actors. Yet, this rational action must be qualified by a strong financial model, identifiable need, and limited novelty, which constrains uncertainty and bolsters confidence in the idea (Study 2). While field research observes greater entrepreneurial action among impulsive actors (Wiklund et al., 2017), this may reflect the range of idea stimuli present in real-world contexts and impulsive actors' disregard for the potential consequences. In a controlled experiment, where only a single EE and idea are considered, VIQ varies more significantly than action. These results highlight an important point: Although entrepreneurial decision logic research often views uncertainty as an ontological reality that must be dealt with by entrepreneurs (c.f., Ramoglou, 2021), I show that individuals alter this reality by pursuing ideas at varying VIQ, partly as a function of their impulsiveness. This result further aligns with research in strategy suggesting that business

model design enables "selection" (whether consciously or automatically) of the environmental characteristics faced (Lecocq, Demil, & Ventura, 2010).

Finally, support (Study 1) and marginal support (Study 2) was found for entrepreneurial experience as a moderator of the hedonic impulses-VIQ relationship. This extended to significant moderated-mediation effects of lack of premeditation, urgency, and lack of perseverance on VIQ (Study 1). Non-significant mediated effects found at low experience levels indicate that trait impulsivity drives hedonic impulses regardless of experience, yet the benefits for VIQ may only occur from moderate experience levels.

Overall, evidence gleaned from my two studies indicates that entrepreneurial impulsiveness is more complex than currently articulated (Lerner, Hunt, & Dimov, 2018; Pietersen & Botha, 2021; Wiklund, Yu, & Patzelt, 2018). I next discuss the theoretical and practical implications thereof for entrepreneurship.

3.8.1 Theoretical implications

First, despite the uncertainty-analysis tension, extant entrepreneurship theory has assumed rational analysis as the normative basis for high VIQ (McMullen & Shepherd, 2006). I offer the first empirical investigation of the influence of impulsive traits on VIQ, thus empirically establishing the relevance thereof as a counterweight to the prevailing analytical perspective. Since the efficacy of venturing depends partly on the quality of the idea the actor is attempting to instantiate (Davidsson, 2015), I illuminate the potential efficacy of impulsivity as a basis for venturing.

Second, although research indicates the relevance of impulsivity traits to entrepreneurship, exposition of the cognitive mechanisms explaining this relevance is only just emerging (Pietersen & Botha, 2021). By linking the biologically grounded umbrella of impulsivity traits to both disinhibition and hedonic impulses, I show that circumscribing impulsivity to disinhibition leads to an inadequate portrayal of impulsiveness as a lack of dispassionate analysis (utility maximization). Rather than conceptualizing impulsiveness on an unidimensional spectrum from disinhibited to analytical (Lerner, Hunt, & Dimov, 2018), I show that including hedonic impulses explains the impact of impulsivity traits on entrepreneurial phenomena (i.e., VIQ) that cannot be explained by existing disinhibition-

based theorizing. I thus advance support for a model of the dual cognitive processes explaining entrepreneurial impulsiveness, that (as illustrated below) opens substantial new avenues for more precisely unraveling the effects, and efficacy, of this cognitive strategy as a basis for venturing (Evans, 2008; Hodgkinson & Healey, 2011).

The focus on disinhibition and providing descriptive evidence that some entrepreneurs systematically deviate from the norms of rationality has led to mounting discomfort with what this evidence entails in terms of how individuals should pursue venture ideas (Miller, 2007; Zhang & Cueto, 2017). Although impulsiveness, through the lens of disinhibition, is associated with increased entrepreneurial action, is it really desirable to be more impulsive if it simply results in unfettered, unplanned action on any venture idea (Wiklund, Patzelt, & Dimov, 2016)? Using a dual-process lens contributes to this conundrum by eschewing reliance on descriptive accounts of deviations from the rational analysis precepts of expected utility theory (c.f., Miller, 2007) and revealing an alternative to expected utility in the pursuit of high VIQ.

More specifically, scholars have acknowledged that outcome uncertainty requires one to, at least to a degree, violate the precepts of expected utility maximization by disregarding potential consequences in deciding to pursue a venture idea (Lerner, Hunt, & Dimov, 2018; Miller, 2007). However, I illustrate that it matters whether this impulsiveness manifests through disinhibition or hedonic impulses due to the different implications for first-person VIQ. By facilitating autonomous pattern recognition and visceral action, hedonic impulses can enhance VIQ while requiring no explicit reasoning and endorsement from analysis. While disinhibition is largely associated with maladaptive behaviors (Ainslie, 1975), passions may at times override even the most cogent reflective judgments (Hofmann et al., 2009). This autonomous processing can be a source of vision and motivation to pursue a high-quality venture idea that would otherwise be avoided if the decision were purely a dispassionate analytical exercise. The recognition of hedonic impulses as a distinct, potentially “prudent” impulsive pathway (Epstein, 2008, p. 33) thus offers fresh insight into impulsiveness, its potential efficacy, and how both rational analysis and impulsiveness could reasonably co-exist in enhancing VIQ. This is an important contribution as while scholars have recognized that impulse-driven logics of entrepreneurial action should augment, not supplant, the extensive literature taking a rational perspective (Lerner, Hunt, & Dimov, 2018;

Wiklund, 2019), the unidimensional depiction in current impulsivity research lacks a coherent framework for doing so.

Third, I bring clarity to a lively and polarizing debate central to strategic entrepreneurship: the level of reasoned rationality that ought to be ascribed to the behaviors that may ultimately lead to new economic ventures (Brown et al., 2018; Wiklund, 2019). On the one hand, some scholars point to the impulsivity literature as evidence that a lack of reasoning can play an important role in entrepreneurship (e.g., Wiklund, 2019). On the other, due to current impulsivity-entrepreneurship research relying on cross-sectional and prospective surveys (Lerner, Hatak, et al., 2018; Wiklund et al., 2017), alternative, highly analytical accounts for an impulsivity-entrepreneurship link have proliferated. For instance, impulsive individuals may follow highly analytical pathways to venturing by considering self-employment more suited to their personality (Brown et al., 2018). Across two studies, I reveal robust empirical support for the former stance. The prospective survey shows that impulsivity impacts VIQ through disinhibition and hedonic impulses and is reasonably robust to concerns of endogeneity-related bias. Furthermore, while capturing the basis for acting on a venture idea may again introduce endogeneity and *post-hoc* rationalization (Epstein, 2003; Lerner, Hunt, & Dimov, 2018), my experiment and direct behavioral manipulation check limits such risk (Hauser et al., 2018). Based on the premise that decision speed is a key indicator of increased Type 2 reasoning (Hofmann et al., 2009), I show that decisions around a new venture idea based on disinhibition and hedonic impulses are significantly faster than those based on rational analysis. Thus, I provide further credibility to the stance that impulsiveness (through disinhibition and hedonic impulses) ought to be ascribed an important role in the generation and pursuit of new venture ideas.

Finally, I show that entrepreneurial experience does indeed play an important role in amplifying the positive effect of hedonic impulses on VIQ. Impulsive individuals who rely on hedonic impulses (i.e., sensation-seekers, those lacking premeditation, or those high in urgency) tend to pursue higher quality venture ideas. Yet this effect is amplified among those who have gained entrepreneurial experience. As individuals gain entrepreneurial experience, their prototypes become increasingly sophisticated in terms of incorporating the key features related to practically starting a profitable venture (Arentz, Sautet, & Storr, 2013; Gruber et al., 2015). As a result, impulsive reactions to these features become more

appropriate and effective (Epstein, 2003). This finding thus deepens understanding of the impulsivity-entrepreneurship relationship and specifically extends understanding of one of the key factors (i.e., entrepreneurial experience) influencing the efficacy of impulsiveness in entrepreneurship (Shepherd et al., 2007). In addition, since entrepreneurial experience can be acquired (albeit with reasonable effort; Baron & Henry, 2010), this paper offers insight into how the efficacy of impulsiveness in entrepreneurship can be enhanced, and how individuals exhibiting impulsive traits could be assisted to successfully pursue entrepreneurial careers (Antshel, 2018).

3.8.2 Practical implications

Consistent with the growing recognition that understanding venture-level effectiveness requires understanding the individual-level cognitive microfoundations (Bingham et al., 2019), this paper has implications for individual entrepreneurs, entrepreneurial teams, as well as organizations seeking innovative outcomes. Even though, in practice, there is increasing recognition that pursuit of high potential ideas, whether through existing or *de novo* ventures, may entail "jumping off the cliff and assembling the plane on the way down" (Vogel, 2017), my results indicate that caution should be practiced when solely anchoring venture idea pursuit in the notion that one needs to deviate from the analytical precepts of expected utility. Despite encouraging entrepreneurial action, predicating entrepreneurial pursuits on a lack of cold cognition appears to hinder VIQ and will likely lead to costly and fatal errors. Thus, individuals prone to disinhibition should seek to heighten their analytical processing when deciding to pursue a venture idea. Given the predominant focus on rational analysis in the strategic entrepreneurship literature, there are ample suggestions in this regard (Hodgkinson & Sadler-Smith, 2018). For example, this literature offers tools, such as systematic but constrained information search (Fiet et al., 2005), decision-calculus of expected utility (McMullen & Shepherd, 2006), effectuation (Sarasvathy, 2001), product-market positioning (Porter, 1985), the dynamic capabilities framework (Teece, 2007), and systematic analysis of analogs to generate new business models (Martins et al., 2015)–all of which can be employed in pursuing venture ideas from a rational-analytic perspective.

Yet equal attention should be devoted to hedonic impulses. Consistent with prior work (Huang & Pearce, 2015), my results suggest that the dual processes are independent and treating them as such enables one to control the impact of impulsiveness on VIQ in a way

that would otherwise be lacking if current unidimensional perspectives were taken (c.f., Lerner, Hunt, & Dimov, 2018; Pietersen & Botha, 2021; Moore et al., 2021). For example, while my results suggest that analysis significantly heightens the financial favorability of one's idea, it also significantly hinders idea novelty. On the other hand, hedonic impulses appear to encourage pursuit of novel ideas. According to CEST these independent processes are parallel-competitive: they integrate in a seamless manner, sometimes reinforcing the same behavior or, in times of conflict, each process contributing in proportion to its activation (Epstein, 2008). Thus, entrepreneurs and venture managers seeking high VIQ would benefit from also pursuing ideas which they experience a strong hedonic drive toward, an idea so compelling and exciting that its intuitive appeal overrides even their most cogent analytical judgments highlighting possible feasibility limitations of a novel idea (Hofmann et al., 2009). This indicates that the best results likely emerge for individuals who simultaneously harness their rational and visceral faculties, blending effortful, unemotional analysis of venture idea feasibility (Baron & Ensley, 2006), with the skilled utilization of hedonically-driven impulses toward some ambitious venture idea, which is unfettered by rules and potential consequences.

Furthermore, one should consider whether their entrepreneurial experience is sufficient and adjust their processing logic accordingly (Epstein, 2003).[12] For example, novice entrepreneurs should be cautious about relying on hedonic impulses and may be better advised to employ analytical processing. Nevertheless, since intuitive processing autonomously influences behavior, failure to acknowledge its role means that one will be controlled by it in subtle ways (Epstein et al., 1996). Thus, one should seek relevant entrepreneurial experience to refine their venture prototypes. In seeking this experience, entrepreneurship pedagogy and its experiential learning interventions have been shown to significantly improve novices' venture prototypes (Costa et al., 2018), and may provide a secure environment, particularly for impulsive novices, to enhance their efficacy.

3.9 LIMITATIONS AND FUTURE RESEARCH

This paper has limitations that future research could address. First, the REI measure in Study 1 may better capture analytical than intuitive processing (Hofmann et al., 2009). However, to the extent this is the case, the effect of trait impulsivity on Type 1, and Type 1 on VIQ may be underestimated, further suggesting the relevance of my model for further

inquiry. Future research should seek to incorporate more robust approaches, such as experimental designs (as in Study 2) or more implicit measures that begin to limit measure contamination with Type 2 control (Hofmann et al., 2009; Pietersen & Botha, 2021). Second, although the Study 2 experiment offers a more controlled test of the theorized effects, there remains the question of how ecologically valid an experimental task requiring generating ideas in a relatively short timeframe is. That is, do the experimentally observed effects of impulsiveness hold in real-life settings in which individuals can discuss their ideas with others and take more time to assess them? While this remains a valid concern which warrants further research, Study 1 produced similar results to Study 2. Since Study 1 entailed a prospective survey, it provides confidence that the results obtained from the more controlled and objective setting of Study 2 is grounded in realistic psychological processes that withstand the influence of confounding variables in everyday life (Grégoire et al., 2019). In addition, following theorizing regarding impulsiveness in entrepreneurship (Lerner et al., 2018), to the extent that one is impulsive, one would largely forgo the opportunity to discuss an idea with others and take time to evaluate the idea–suggesting the experimental results will generalize well in real-world contexts. Third, the VIQ measure in Study 1 may be constrained by self-report bias. Although reasonable efforts were undertaken in Study 1 to control for self-report bias, and Study 2 was particularly suited to addressing the concerns of self-reported VIQ (since VIQ was captured by independent experts), there still remains a need for future inquiry to verify this paper's results. To this end, the collective studies in this paper should provide reasonable impetus for this deeper future inquiry. Finally, although central to venture success (Kornish & Ulrich, 2014), venture ideas are also subject to development and pivoting. Claims that a venture idea is valuable yet remains to be successfully exploited cannot be refuted since the claim can be made *ad infinitum*. Nevertheless, the risk of committing significant funds and time to misdirected venture ideas–sometimes with devastating consequences (Ucbasaran, Shepherd, Lockett, & Lyon, 2013), suggests that high VIQ should be sought sooner rather than later, and this paper informs this point.

3.10 CONCLUSION

Entrepreneurs' venturing success is inherently tied to VIQ. This paper stimulates reconsideration of the incumbent assumption that rational analysis is the way that entrepreneurs ought to frame and act on new venture ideas. For appropriately experienced

individuals, hedonic impulses may be a “suitably irrational” way to proceed in venture idea pursuit. While acknowledging the indisputable value of rational analysis, the hope is that this work advances understanding of the problem of venturing under uncertainty while simultaneously encouraging further research into the role of a broader panoply of entrepreneurial decision processes which appear to occur in reality.

3.11 ENDNOTES

[1]Scholars have also suggested (Wiklund et al., 2016), and agent-based models have found (Lerner et al., 2017), that disinhibited entrepreneurial action may eventually, in aggregate, result in higher VIQ than more rational action. This is because disinhibition increases the volume of ideas explored under uncertainty which should push VIQ outcomes to both tails of the distribution: some ideas are misses, while others may be break-throughs. While an interesting topic in itself, I focus instead on the effects of cognition on a particular idea rather than aggregate effects that may fortuitously emerge over a span of idea pursuits and time.

[2]To illustrate, sensation-seekers may spend a significant time assessing and planning a risky and emotionally exciting endeavor (e.g., skydiving; Lerner et al., 2018). Similarly, individuals high on urgency may drink alcohol and drive while fully analyzing the consequences, yet they still do so due to their emotional state (Hofmann et al., 2009).

[3]According to Westland’s (2010) algorithm for computing SEM sample size requirements, the model requires 214 cases. The algorithm by MacCallum, Browne, and Sugawara (1996), with 2578 degrees of freedom and 228 cases, yields sufficient statistical power ($\pi > 0.99$) to detect global model misspecification. Although on the lower bounds, these tests indicate the sample size fulfilled the requirements for SEM.

[4]Following guidelines (Bernerth & Aguinis, 2016), I estimated the model with and without the controls. No substantive differences in parameter estimates were found.

[5]Due to skewed distribution, I repeated the analyses using the log-transformed number of employees and received similar results. I thus retained the raw scores to ease interpretation (Becker, Robertson, & Vandenberg, 2019).

[6]CFI (0.821) and TLI (0.814) were below the 0.9 threshold (Anderson & Gerbing, 1988). However, incremental fit indices, computed by comparing estimated and null models, should

not be interpreted if the null exhibits reasonable fit (RMSEA<0.158) (Kenny, 2015). The null model exhibited fit below this threshold (0.117). Yet the incremental fit indices still approached acceptable, and x^2/DF, RMSEA, and SRMR all indicated good fit. Thus, I deemed the final model acceptable (Faija, Reeves, Heal, & Wells, 2020).

[7]More detail on the endogeneity results is provided in the supplementary material (refer to Appendix H).

[8]I removed 103 respondents plus 82 respondents because they respectively failed at least one attention check or failed to complete all the questions. This attrition rate is relatively common, and removal thereof tends to substantially improve data quality (Abbey & Meloy, 2017; Frederiks et al., 2019).

[9]While an alternative disinhibition manipulation (van den Bos et al., 2009) was included, manipulation checks showed it was ineffective–thus being excluded from further analysis.

[10]Standardized r_{wg} values employed slightly skewed distributions (Woehr et al., 2015).

[11]Impulsive and restrained behavior can emerge from analysis or intuition (Carver & Johnson, 2018; Evans & Stanovich, 2013). To illustrate, urgency autonomously generates anxiety and threat avoidance as the primary intuition, resulting in restraint (Carver, 2005). Lack of perseverance autonomously generates an unwillingness to pursue challenges and reward insensitivity, similarly resulting in restraint (Berg et al., 2015).

[12]Both processes can be employed by asking: “How do I feel about doing this, what do I think about doing it, and considering both, what should I do?” (Epstein, 2003, p. 177).

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CHAPTER 4 (PAPER 3):

REFLECTIVE VERSUS IMPULSE-DRIVEN APPROACHES TO ENTREPRENEURIAL LEARNING: EXPLORING A PATHWAY UNFETTERED BY UNCERTAINTY

Chapter 4 presents Paper 3. This Paper presents a mechanism explaining *how* impulsivity impacts entrepreneurial learning and has been submitted to the Journal of Small Business Management.

4 **ABSTRACT***Entrepreneurial learning has largely been viewed as a reflective process; a process guided by some prescient entrepreneurial goal. Yet, uncertainty inherent in entrepreneurship suggests limitations to this view. Drawing on Emotion-as-Feedback Theory, I investigate a more impulse-driven approach to entrepreneurial learning. Survey data from entrepreneurs (N=584), assessed using latent moderated structural equations, reveals mostly U-shaped indirect effects of multidimensional impulsivity on entrepreneurial learning. I uncover affect experienced in the moment as a mechanism explaining these effects and the forecasting of positive affective consequences–a more reflective category of affect–as a moderator augmenting these effects. Overall, I demonstrate value to this impulse-driven approach, particularly under uncertainty and in terms of predicting venturing performance 12 months later. Unfettered by the uncertainty plaguing more reflective views, this paper advances an important alternative to entrepreneurial learning, with broader implications for understanding the role of time in the venturing process.*

Keywords–Impulsivity, entrepreneurial learning, uncertainty, current affect, anticipated affect, temporal discounting

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4.1 INTRODUCTION:

In a milieu characterized by conditions of change, uncertainty, complexity, and other knowledge problems (Townsend et al., 2018), entrepreneurial learning (EL) has become common currency for individuals attempting to effectively navigate the pursuit of an entrepreneurial opportunity (Harrison & Leitch, 2005). Yet, this same uncertainty challenges the prevailing assumption in the literature that EL is predominately teleologically-driven, reasoned and reflective (Winkler et al., 2021) rather than driven by any form of impulses in the present moment (Hunt & Lerner, 2018). To this end, impulsive behavior, defined as "rapid, unplanned reactions to internal or external stimuli without regard to the negative consequences of these reactions" (Moeller et al., 2001, p. 1784), is emerging as a trenchant alternative that may re-shape understanding of how EL takes place, and more broadly, how the entrepreneurial process unfolds (Lerner et al., 2018; Wiklund et al., 2016).

EL refers to the ability to successfully and suitably adjust actions based on feedback in the entrepreneurial context (Haynie et al., 2012). Perhaps unsurprisingly then, the adaptability inherent in the EL construct has led to a stream of research illustrating the value of EL for

homing in on and understanding latent market needs (Bao et al., 2020), producing more innovative products (Marvel et al., 2020), increasing employee growth (Sullivan et al., 2021), and enhancing other venture performance metrics (Zhao et al., 2011). In addition, scholars have explored the predictors of EL, including how network ties (Sullivan et al., 2021), entrepreneurial orientation (Anderson et al., 2009), entrepreneurial experience (Winkler et al., 2021), critical reflection in response to ambiguity (Kubberød & Pettersen, 2017), and failure as a feedback event (Lattacher & Wdowiak, 2020), serve as key drivers of EL. However, in seeking to understand how EL occurs, this body of knowledge L has to date borrowed heavily from established organizational (March, 1991) and experiential (Kolb, 1984) learning theories, theories which are steeped in assumptions of reasoned reflection (c.f., Wang & Chugh, 2015). The general assumption from a reasoning perspective is that for EL to productively occur, entrepreneurs must consciously reflect on their progress toward some ultimate teleological opportunity and control their actions to navigate toward it (Bylund & Packard, 2021; Lerner et al., 2018). While this reflective, teleologically-driven approach undoubtedly leaves an indelible mark on EL (Winkler et al., 2021), at least two points provide compelling reason to investigate a broader view.

First, a burgeoning stream of research indicates that impulsivity, the ostensible antithesis of reasoned reflection, also plays a meaningful role in the venturing process (Lerner et al., 2021; Verheul et al., 2016; Wiklund et al., 2017). Although emerging (Pietersen & Botha, 2021), this burgeoning research has prompted calls for more extensive theoretical development and empirical investigation into the role of a lack of reasoning in venturing (Lerner et al., 2018; Van Lent et al., 2021). Second, full adherence to a reflective EL process would necessitate accurate knowledge regarding progress toward an outcome, significant time for reflection, and knowledge of the outcome itself–all of which appear at odds with the uncertain entrepreneurial process (Alvarez & Barney, 2007; Ramoglou, 2021). While reflective learning may be suited to more predictable organizational contexts (March, 1991), entrepreneurs face a unique context in which uncertainty is so extreme it qualifies as unknowable: it is impossible to *ex ante* possess knowledge about, and *ex post* pinpoint the precise cause of, future states (Townsend et al., 2018). This “unbearable elusiveness” (Dimov, 2011) of accumulating knowledge regarding an opportunity to guide one’s actions raises the key question of how EL might productively occur in entrepreneurship as a distinct domain (Politis, 2005; Wang & Chugh, 2015).

My core contention is that to move forward with stronger, more veridical theory of how EL takes place from a reasoning perspective; exposition is required of less reasoned processes (Lerner et al., 2018) namely, the role played by impulsivity in EL. I theorize and test a model aimed at explaining this role, specifically following prior research to operationalize EL as a retrospective assessment of one's proficiency at generating knowledge based on feedback and using this knowledge to adapt actions for a better result in the entrepreneurial context (Anderson et al., 2009; Haynie et al., 2012). Drawing from Emotion-as-Feedback Theory (EFT; Baumeister et al., 2007), which argues that affect is a key feedback mechanism for learning, I theorize and find that an impulsive individual's immediate affective reaction to uncertainty is a key mechanism driving EL. I further extend my theorizing to discern between two temporal categories of affect, which entrepreneurship research has yet to consider (Delgado García et al., 2015): current and anticipated affect. While anticipated affect is a forward-looking evaluation (forecast) of the emotions one expects to experience in the future (Loewenstein et al., 2001), current affect refers to emotions experienced in the present (Baumgartner et al., 2008). Research indicates that these temporal categories are a valid means for distinguishing between reflective (Baumgartner et al., 2008; Loomes & Sugden, 1982) versus unreasoned (Frijda et al., 2014) processing, respectively. Following EFT (Baumeister et al., 2007), I thus assess the role of each category in relation to impulsivity and EL. Specifically, I posit that heightened reactivity to current affect is a key mechanism through which the realities of the present are understood, responded to, and resolved so that EL can meaningfully occur in uncertain entrepreneurial pursuits.

In so doing, I offer several contributions. First, by challenging the prevailing rationality assumption of EL research, I broaden understanding of how EL occurs while establishing entrepreneurship as a learning domain distinct from the theories of organizational learning the field has inherited (Wang & Chugh, 2015). Second, by differentiating between two key temporal categories of affect and illustrating how each operates and interacts to influence EL, I begin to unravel understanding of how impulsivity impacts temporality in entrepreneurship (Van Lent et al., 2021). I show how the predominant teleologically-driven perspectives of current EL research may be overly restrictive and limiting advancement of the field (Lerner et al., 2018). Finally, by departing from assumptions of linearity, I answer the call for research on ostensibly 'dark' personality traits (e.g., impulsivity) in

entrepreneurship to move beyond notions of being unequivocally bad or good toward more complex and descriptive nonlinear relationships (Smith et al., 2018). I commence development of the hypothesized effects with a description of the various dimensions of impulsivity, affect, and the integration of the two through EFT (Baumeister et al., 2007).

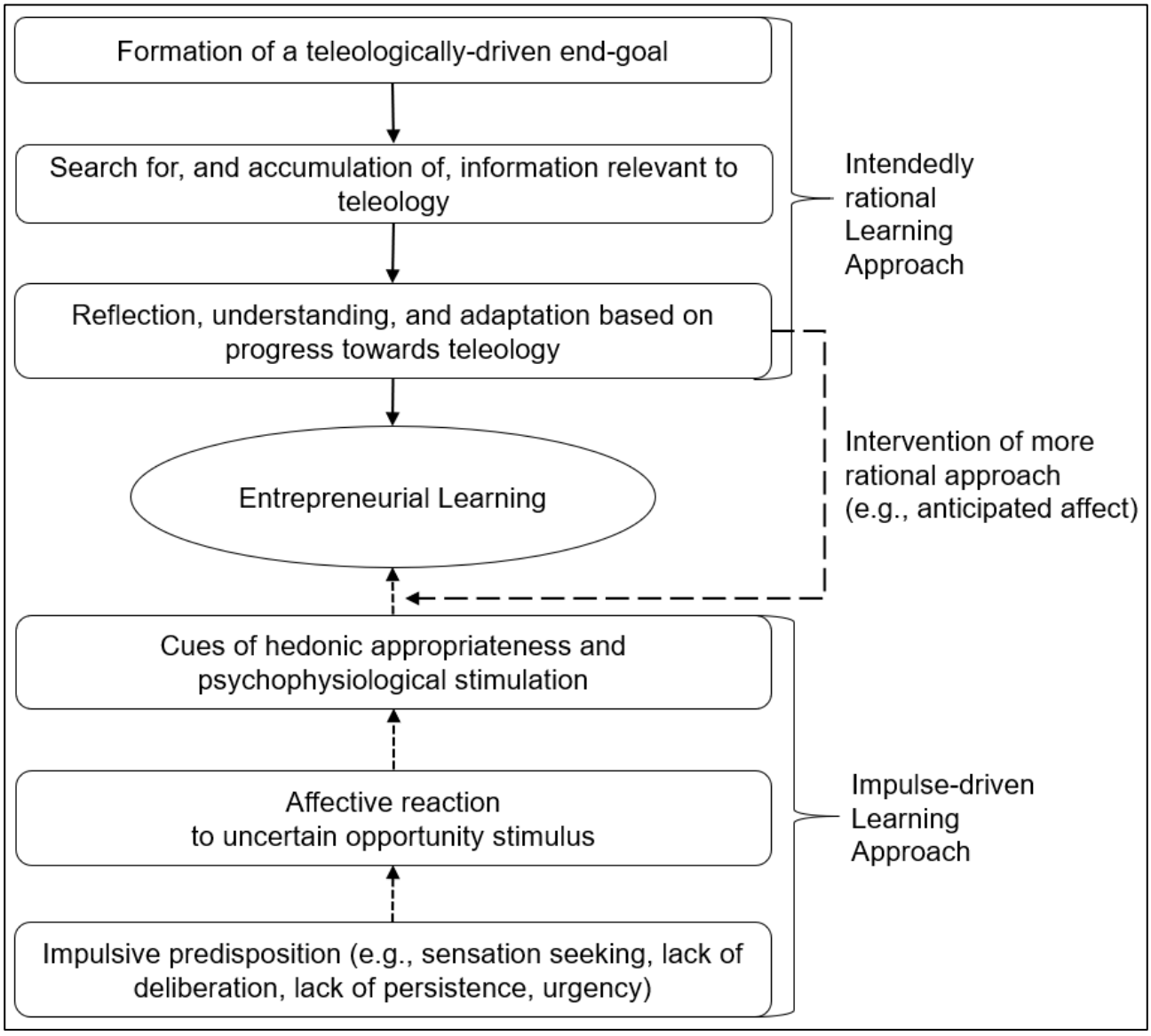
4.2 THEORETICAL FOUNDATION

4.2.1 Temporality, impulsivity and affect in the EL literature

With few exceptions, extant EL literature has taken a reflective view, investigating predictors of EL like intentionality (Dimov, 2007), knowledge seeking behavior (Scarmozzino et al., 2017), emotion regulation (He et al., 2018), and causal ascription to failure (Yamakawa & Cardon, 2015). In this view, the entrepreneur is elevated to the status of prescient progenitor (Dimov, 2011), and the imagined future opportunity becomes the temporal beacon through which all subsequent information is consciously understood, interpreted, reflected on, and redirected toward (Brettel & Rottenberger, 2013; Wood et al., 2021b). Yet, for impulsive individuals, often present feelings, rather than imagined futures and affective forecasts, stir action (Franco-Watkins et al., 2016; Frijda, 2010). Considering the burgeoning literature linking impulsivity to the venturing process (Lerner et al., 2021; Pietersen & Botha, 2021; Wiklund et al., 2017), this temporal discounting of the future appears relevant and uniquely placed to broaden understanding of how EL may productively occur in contexts of unknowable futures beyond the confines of reflection.

Drawing from Lerner et al. (2018), I posit that an impulse-driven, in contrast to a reflective approach to EL involves limited reliance on an end-goal, negligible information processing, and a greater reliance on immediate hedonic drivers as a guide for EL (refer to Figure 4.1). Thus, I sought to explain how, by facilitating learning at a more basic, psychophysiological level (Baumeister et al., 2007), current affect may benefit EL. Yet, in acknowledging a dual-process view in which more reflective and unreasoned processes can co-occur (Baumeister et al., 2007), I posit that anticipated affect remains a key EL mechanism that stimulates reflection and regulates behavior toward a goal. I thus take a default-interventionist stance (Hodgkinson & Sadler-Smith, 2018) and argue that although impulsive individuals may default to impulse-driven affective processing, anticipated affect may also intervene and modify their processing (Baumeister et al., 2007).

Figure 4.1: Reflective versus Impulse-driven approaches to entrepreneurial learning



I specifically operationalize impulsivity using Whiteside and Lynam's (2001) widely recognized (Berg et al., 2015; Sharma et al., 2014; Wiklund et al., 2017) four-dimensional conceptualization. This conceptualization accounts for four distinct etiologies of 'impulsive-like behaviors' (Whiteside & Lynam, 2001, p. 685): (1) sensation-seeking, defined as an inclination to take pleasure from and pursue new, exhilarating, and potentially risky endeavors; (2) lack of premeditation, referred to as a lack of reflection and reasoned consideration of the consequences prior to acting; (3) lack of perseverance, reflecting the inability to resist distractions and stay focused on uninteresting or difficult tasks; and (4) urgency, regarded as the propensity to experience strong, typically negative, emotions and urges to act to relieve those emotions regardless of the potential consequences.

Before elaborating on the theorized model, it is important to, following the affect literature (Baumeister et al., 2007; Foo et al., 2015), distinguish between two basic facets of affect: activation (low–high arousal) and valence (pleasant–unpleasant). As a more stable and generalized emotion, anticipated affect is generally experienced as a single, unitary feeling (i.e., the valences are mutually exclusive) (Baumeister et al., 2007). Anticipated affect only tends to influence behavior at moderate to high levels of activation (Baumgartner et al., 2008; Knutson & Greer, 2008). I thus limit my focus to highly activated forms of anticipated affect (e.g., excitement or tension) and assess the valence thereof on a single, bipolar dimension (Baron et al., 2012). Conversely, as a more fleeting and simple affective response, current affect can take the form of positive (PA) or negative (NA) affect states[1], which are orthogonal and vary in activation. That is, the valences can co-occur such that low NA does not correlate with, or render the same outcomes as, high PA (Watson et al., 1999). I thus investigate the level of activation of PA and NA separately. While high PA reflects a state of enthusiasm, vigor, attentiveness, and enjoyment, low PA reflects apathy and lethargy (Watson et al., 1988). Conversely, while high NA reflects a state of displeasure, distress, anxiety, and fear, low NA reflects peace and calm (Watson et al., 1988).

4.3 HYPOTHESIS DEVELOPMENT

4.3.1 First-stage: impulsivity and current affect

Entrepreneurship is an affect-laden journey (Baron, 2008). While numerous factors (e.g., customer feedback on a prototype) can engender specific affective responses during opportunity pursuit, uncertainty remains omnipresent throughout the process (Ramoglou, 2021) and strongly influences entrepreneurs' affective experience (Morris et al., 2012). I thus argue that uncertainty serves as a stable theoretical anchor for understanding the overall affect aroused by the start-up event and how affect impacts EL. According to EFT, individuals acting under uncertainty will experience affective reactions, which, if significant, serve as a key input for learning (Baumeister et al., 2007). The keyword here is significance. Since affective arousal provides the motivation to mobilize behavioral resources (Eben et al., 2020) events that do not arouse a significant affective response are unlikely to be attended to, remembered, acted on, and ultimately learned from (Baumeister et al., 2007).

Yet individuals vary significantly in their affective reactions to uncertain venturing contexts (Delgado García et al., 2015). In particular, certain impulsivity dimensions appear to directly influence individuals' affective reactions to uncertain events (Leland et al., 2006), such as entrepreneurial pursuits. However, since multidimensional trait impulsivity consists of four distinct etiologies of 'impulsive-like behaviors' (Whiteside & Lynam, 2001, p. 685), I hypothesize that each impulsivity trait will have unique effects on the current affect experienced during opportunity pursuit.

In particular, sensation-seeking and urgency are, as per Whiteside and Lynam's (2001) definition, directly rooted in greater emotional reactivity to uncertainty (Berg et al., 2015; Johnson et al., 2020). Sensation-seekers are attracted to, excited by, and take pleasure from pursuing uncertain situations (Whiteside & Lynam, 2001). The tendency to take pleasure from uncertain situations suggests that sensation-seekers will experience high levels of PA regarding an uncertain entrepreneurial pursuit (Wiklund et al., 2018). On the other hand, urgency is specifically defined as a proclivity for experiencing strong NA (Whiteside & Lynam, 2001), particularly in relation to uncertain, potentially threatening situations (Paulus, 2007). Since individuals high in urgency have a poor tolerance for uncertain and potentially hazardous situations (Kaiser, Milich, Lynam et al., 2012), they are highly susceptible to experiencing negative affect under conditions of uncertainty (Whiteside & Lynam, 2001). Therefore, those high in urgency likely exhibit heightened NA regarding an uncertain entrepreneurial pursuit (Wiklund et al., 2018).

The other two dimensions of impulsivity appear to have a less direct relationship with affect (Johnson et al., 2020). Lack of persistence and deliberation are associated more closely with a lack of intervention from executive planning and control processes, rather than per se being driven by heightened affective reactions (Carver & Johnson, 2018). Nevertheless, these dimensions of impulsivity still exhibit effects on one's tolerance for uncertainty (Pawluk & Koerner, 2016), which, following Wiklund et al. (2018), I argue influences their current affect. Individuals lacking deliberation give limited consideration to the potential consequences (positive or negative) of uncertain situations (Loewenstein et al., 2001; Whiteside & Lynam, 2001). Therefore, research shows that they generally experience low NA, reflecting a state of peace and calm rather than fear and anxiety in relation to uncertainty (Pawluk & Koerner, 2013). Furthermore, I posit that individuals lacking perseverance

experience both high levels of NA and low levels of PA. These individuals cannot persist through arduous tasks and distractions (Whiteside & Lynam, 2001). Yet, the entrepreneurial context represents a situation that is uncertain, difficult to assess, and involves complex information. They thus probably experience high NA regarding whether they can fully assess an entrepreneurial opportunity (Wiklund et al., 2018) and experience a sense of sadness and lethargy (i.e., low PA) regarding the complexity and difficulty of the task (Watson et al., 1988). Indeed, lack of perseverance has been positively linked to anxiety (i.e., high NA) (Gay et al., 2011) and depression (Billieux et al., 2008), fatigue and lethargy (i.e., low PA) (Johnson et al., 2013), regarding following through with complex tasks. Although heterogeneity of the impulsivity construct intimates that not all dimensions are primarily affect-driven (Berg et al., 2015), the aim here is to simply show that some (not all) impulsivity dimensions drive greater reactivity to current affect, which I hypothesize is particularly the case for sensation-seeking and urgency:

H1: Multidimensional impulsivity exhibits distinct effects on current affect experienced in the pursuit of an opportunity, such that:

(a) Sensation-seeking increases PA

(b) Urgency increases NA

(c) Lack of premeditation decreases NA

(d) Lack of persistence decreases PA and increases NA

4.3.2 Second-stage: current affect and EL

EL reflects one's proficiency at generating knowledge from feedback and using it to adapt actions for a better result in the entrepreneurial context (Anderson et al., 2009). Yet, in an environment replete with uncertainty (Townsend et al., 2018), the benefits of affective forecasting and reasoned knowledge generation is curtailed (Huang & Pearce, 2015; Williamson et al., 2019), while a premium is placed on rapid decision-making (Bakker & Shepherd, 2017; Lerner et al., 2018). Current affect therefore seems well-situated in time to influence impending decisions (Knutson & Greer, 2008), and produce appropriate responses to contexts presenting uncertain rewards and losses (Bechara et al., 1994). Uncertainty inherent to venture start-up automatically and non-consciously evokes a cloud of affective associations (Frijda et al., 2014). According to EFT, these states of current affect facilitate learning at a psychophysiological level by (1) signaling the valence of immediate events, which (2) unconsciously stimulate approach or avoidance reactions (Baumeister et

al., 2007) depending on whether the action renders one's relation to these events more or less (un)pleasant (Corr & McNaughton, 2012; Frijda et al., 2014).

That is, current affect is a source of knowledge regarding what the event could offer the individual (e.g., hurt or satisfy), which gives rise to a psychophysiological response of either approach or avoidance based on that knowledge (Baumeister et al., 2007). Thus, affect valence is orthogonal to the psychophysiological response[2]. Without one's conscious endorsement, heightened states of current affect strongly arouse the motivational force to act, to undertake effort to improve the hedonic valence of the immediate situation (Frijda et al., 2014). At any given moment, the environment offers a range of affordances: the various possibilities for action provided or not (DeWall et al., 2016). Heightened states of current affect arouse increased action and adaptation, *ad hoc,* based on these affordances (Frijda et al., 2014).

For example, an entrepreneur highly excited by or fearful of uncertainty in their pursuit may be compelled to pivot aggressively (regardless of any ultimate goal) in response to poor customer feedback. Or with low sales, they may make product delivery commitment adjustments (e.g., quality, performance) to close a sale that most would be unwilling to do. In both cases, heightened states of current affect provide knowledge from feedback events (in these cases, negative feedback events) which directly produce a psychophysiological response (Baumeister et al., 2007). This response results in the individual decisively adapting their entrepreneurial action under uncertainty based on that knowledge (Bechara et al., 1994). Thus, because current affect is a source of knowledge which gives rise to behavioral adaptation (approach or avoidance) based on environmental affordances (Baumeister et al., 2007; Frijda et al., 2014), I hypothesize that it has a direct effect on one's proficiency at generating knowledge from feedback and using it to adapt actions for a better result in the entrepreneurial context (i.e., EL; Anderson et al., 2009).

Since PA stimulates a broadening of attention and scope affordances perceived in the environment (Fredrickson & Branigan, 2005), I hypothesize a positive linear effect of PA on EL. However, since NA stimulates a narrowing of attention and scope of perceived affordances (Bolte et al., 2003), I expect the effect of NA to operate in a curvilinear, U-shaped fashion. At moderate levels, NA narrows thoughts and actions resulting in individuals

maintaining or slightly amending the status quo, so long as it is tolerable (Baumeister et al., 2007). However, beyond a certain inflection point, NA causes sufficient discomfort and displeasure that substantial corrective action (adaptation) is undertaken to render one's relation to these events less unpleasant (Baumeister et al., 2007). In this heightened state of NA, individuals are more willing to take risks, more likely to make impulse-driven, radical changes to behavior (Baron et al., 2012; Baumeister et al., 2007) and experience a more intense compulsion to expend effort to make course corrections (De Dreu et al., 2008; Gendolla & Krüsken, 2002). Thus, like the compulsion to rid oneself of an itch (Frijda et al., 2014), I expect that heightened NA will strongly motivate entrepreneurs to resolve the uncertainty (the cause of their NA) in their pursuit. In support of my predictions, research shows that heightened states of both PA and NA facilitate learning (Baas et al., 2008; McConnell & Eva, 2012). Furthermore, research shows that only heightened (not moderate) NA benefit learning (McConnell & Eva, 2012; Van-Dijk & Kluger, 2004), especially in entrepreneurship research, which has mostly observed a positive NA-EL link in the context of highly negative affective events, such as venture failure (Byrne & Shepherd, 2015; He et al., 2018; Shepherd et al., 2011). Overall, the need to frequently, and often radically, adapt to feedback in the uncertain entrepreneurial domain (Wiklund et al., 2018), suggests that heightened affective reactivity in the moment will be conducive to EL:

H2a: PA is positively and linearly related to EL.

H2b: NA has a U-shaped relationship with EL: EL decreases with NA until an inflection point and then increases with NA.

4.3.3 Indirect effects: impulsivity and EL

As per the predictions of EFT (Baumeister et al., 2007), my theorizing suggests that certain impulsivity dimensions strongly impact one's affective reaction to uncertainty (*H1a-d*). In particular, as detailed in the development of the first-stage effects hypotheses, sensation-seeking and urgency appear to be, as per Whiteside and Lynam (2001), partly defined by their greater emotional reactivity to uncertainty (Berg et al., 2015; Johnson et al., 2020). Moreover, by relating closely to one's reaction to uncertainty, lack of premeditation and persistence are also theorized to influence individuals' affective reactions to the uncertain entrepreneurial domain (Wiklund et al., 2018). According to EFT, these affective reactions act as a key mechanism explaining EL (Baumeister et al., 2007). As detailed in the development of the second-stage effects hypotheses, heightened current affect drives EL

by (1) signaling the valence of immediate events, which (2) unconsciously stimulate approach or avoidance reactions (Baumeister et al., 2007). Following this reasoning, PA is theorized to have a positive linear (*H2a*), while NA is theorized to have a U-shaped (*H2b*), relationship with EL. Combining these theorized first- and second-stage effects, I hypothesize mediated effects for each of the impulsivity dimensions on EL through current affect. Impulsive individuals exhibit a unique affective reaction to uncertain entrepreneurial opportunities (Leland et al., 2006), and when this affective reaction is heightened, it provides an explanation, from a reasoning perspective, as to how impulsivity can drive EL (Baumeister et al., 2007). Thus, my hypothesis development suggests that it is not so much that impulsive individuals experience affective reactions different to the general population of entrepreneurs. It is that certain impulsivity dimensions elicit heightened activation of these emotional reactions which engender greater attention and adaptation to present affordances (Frijda et al., 2014), ultimately enhancing EL (Baumeister et al., 2007):

H3a: Sensation-seeking is positively and linearly related to EL through PA as a mediating mechanism.

H3b: Urgency has a U-shaped relationship with EL through NA as a mediating mechanism.

H3c: Lack of premeditation has a U-shaped relationship with EL through NA as a mediating mechanism.

H3d: Lack of persistence has a U-shaped relationship with EL through the additive combination of PA and NA as mediating mechanisms.

4.3.4 Moderating effects: anticipated affect

Consistent with a default-interventionist stance (Hodgkinson & Sadler-Smith, 2018), EFT asserts that current affect governs behavior only to the extent that this more automatic processing can generate behaviors that sufficiently render one's circumstances more pleasant (Baumeister et al., 2007). If an appropriate reaction cannot be generated, intervention by anticipated affect may provide a beacon through which current affect is interpreted and actions generated (Frijda et al., 2014). Since heightened PA is already associated with broader attention and scope of affordances perceived in the environment (Fredrickson & Branigan, 2005), relevant actions are likely to come to mind immediately and be enacted without requiring intervention from anticipated affect (Baumeister et al., 2007).

However, since NA stimulates a narrowing of attention and scope of perceived affordances (Fredrickson & Branigan, 2005), positive anticipated affect may help generate relevant actions (Baumeister et al., 2007). My theorizing suggested that action will only occur at high levels of NA, where one is sufficiently distressed and motivated to adjust behavior radically, rather than maintain the status quo. I argue that the tendency not to act and rather maintain the status quo will be attenuated by the anticipation of positive outcomes because it increases one's motivation to change action sooner and encourages more cognitive consideration of possible future action paths to remedy the NA (Bulley et al., 2016). Therefore, by enhancing action likelihood, the inflection point of the U-shaped NA-EL relationship should shift left as positive anticipated affect increases the repertoire of possible actions and motivation to adapt from lower levels of NA:

> *H4*: Positive anticipated affect will moderate the U-shaped NA-EL relationship, such that anticipation of positive affect shifts the inflection point to the left.

4.4 METHODS

4.4.1 Sample and procedure

A survey was conducted among entrepreneurs in South Africa. I defined an individual as an entrepreneur if they (1) owned and (2) operated a business venture, as well as (3) indicated a reasonable likelihood of further entrepreneurial pursuits (Shane & Venkataraman, 2000). Since the focus is on how entrepreneurs learn from and affectively experience their venturing pursuits, these criteria ensured a sample with adequate engagement in the entrepreneurial context to provide valid data (Podsakoff et al., 2012), while also reducing heterogeneity in entrepreneurial experience levels, which could confound effects on EL (Politis, 2005). To sample individuals who own and operate a venture, I obtained a random sampling frame of 20 000 business owners, stratified according to country-wide distributional data on gender (Herrington et al., 2017), industrial classification, and provincial location (Bureau for Economic Research, 2016), from a market research firm. To validate respondents as entrepreneurs, I used an in-survey screening question drawing from Shane and Venkataraman (2000): "how likely are you to introduce and sell, for a profit, new products, services, raw materials, or business processes within the next 12 months"; and only included respondents who met the criterion of being at least "slightly likely" to do so.

A total of 823 responses were received, of which 11 were eliminated due to missing data on one or more variables in the model. From the 812 usable responses, 72% (584) met the screening criterion and were retained. Thirty-four percent of respondents are female, while 64.5% are male. Forty-one percent of respondents have a postgraduate degree, 19.2% an undergraduate degree, 23% vocational training, and 13.4% secondary school level of education. Respondents ranged from 20-81 years of age with an average age of 50.1 years (SD=12.19). The average entrepreneur had 14 years (SD=9.60) of business ownership experience, with the first and last quartiles having seven and 20 years of experience, respectively. Following Armstrong and Overton (1977), I also investigated non-response bias. Presuming delayed responses proxy for non-responses, early and late respondents' operational industry, business experience, gender, age, education level, and their scores on impulsivity, NA, PA, and EL were compared. No significant differences were found between the two groups ($p>0.05$), showing non-response bias is not a significant concern.

4.4.2 Measures

4.4.2.1 *Independent variables*

Sensation-seeking, Urgency, Lack of Premeditation, and Lack of Persistence Dimensions of Impulsivity. Whiteside and Lynam's (2001) 45-item, four-point UPPS Impulsive Behavior scale captured the four impulsivity dimensions (10-12 items per dimension).

Anticipated Affect. Since anticipated affect is cognitively forecasted rather than experientially felt (Baumgartner et al., 2008), I captured this construct using a three-item, 7-point perceived desirability scale (Krueger, 1993). Respondents rated how they would feel if they started producing and selling a product/service based on a newly identified opportunity. A low score reflects a negative forecast, while a high score reflects the opposite.

4.4.2.2 *Dependent variables*

Positive and Negative Current Affect. Drawing from the 20-item (10 items per dimensions) PA and NA Schedule (PANAS; Watson et al., 1988), I asked respondents how they felt in the moment about their most recent entrepreneurial pursuit (i.e., as a currently experienced emotional state as opposed to an affective forecast), ranging from 1 (not at all) to 5 (extremely).

Entrepreneurial Learning. I assess EL using a six item, seven-point strategic learning capability scale, adapted to the individual level (for a similar approach, refer to He et al., 2018), from Anderson et al. (2009). Rather than quantifying feedback volume or type, the scale captures proficiency at generating knowledge from feedback and using it to adapt actions for a better result (Anderson et al., 2009). Following Anderson et al. (2009) and He et al., (2018), EL is captured retrospectively and treated as the key outcome variable to be predicted. Although the retrospective design limits the ability of the measure to capture the dynamic processes involved in EL, it was deemed suitable for the present study since it provides a valid and reliable basis for assessing whether impulsivity impacts EL as an outcome (Anderson et al., 2009). Research has shown that retrospective accounts converge with real-time accounts (Ptacek et al., 1994), suggesting the EL measure is valid for this study. Additionally, this EL measure has shown predictive validity with more objective measures capturing behavioral adaptation in response to feedback (Anderson et al., 2009). While more objective measures of EL aim to capture EL outcomes, such as performance, EL is only partly about the outcome. EL is primarily about acquiring knowledge and adapting behavior in a meaningful way for the individual (Ucbasaran et al., 2013). Thus, scholars suggest that while there are limitations (as acknowledged), retrospective self-evaluation is appropriate for capturing EL (Liu et al., 2019) and remains the dominant method to date (Lattacher & Wdowiak, 2020; Yamakawa & Cardon, 2015).

4.4.2.3 *Controls*

While my EL measure avoids confounds of prior experience by not capturing EL volume but proficiency (Anderson et al., 2009), I, nevertheless, control for the entrepreneurial experience-learning link (Politis, 2005) using years of prior venture ownership experience. I also control for education as an indicator of learning proficiency (Liu et al., 2019). Finally, as research suggests, those who are willing to persevere through obstacles are more likely to learn (Van Gelderen, 2012), I control for entrepreneurial perseverance (Zhu et al., 2018). Following recommendations (Bernerth & Aguinis, 2016; Spector & Brannick, 2011), I only retained statistically significant controls (entrepreneurial perseverance; $\beta=0.076$, $p>0.05$) and compared the model with and without the controls for differences in substantive parameter estimates[3].

4.4.3 Analyses

I used the latent moderated structural equations (LMS) method (Klein & Moosbrugger, 2000) in Mplus (version 8.4) to estimate the theorized model (refer to Figure 4.3). This approach enables the estimation of latent quadratic and interaction effects while explicitly estimating nonnormality inherent in nonlinear terms (Moosbrugger et al., 2009). Since LMS does not provide global fit measures, I followed the recommended three step procedure (Maslowsky et al., 2015; Sardeshmukh & Vandenberg, 2017): First, I evaluated measurement model fit, excluding any latent interaction terms, using CFA (Anderson & Gerbing, 1988). Second, I compared structural model fit between several nested alternatives to determine which theorized model best fit the data (referred to as Model B) (Anderson & Gerbing, 1988). Finally, using Model B as a baseline, I added the latent interactions to estimate the theorized model (Model I) and assessed its overall fit by comparing it to Model B (Kline, 2016; Maslowsky et al., 2015).

4.5 RESULTS

4.5.1 Reliability and validity

Initially, CFA indicated misspecification of the measurement model (CFI=0.850, TLI=0.842, and RMSEA=0.050). I subsequently removed 13 items from the impulsivity dimensions due to standardized factor loadings below the minimum suggested 0.6 value (Kline, 2016), resulting in an average of eight items per dimension[4]. The retained model demonstrated acceptable fit (CFI=0.907, TLI=0.901, RMSEA=0.040). Table 4.1 reports descriptive, reliability and validity statistics for substantive model constructs. The CR of each construct exceeded the suggested cut-off (0.70) (Nunnally, 1978). Furthermore, discriminant validity is supported by the Maximum Shared Variance and the Average Shared Variance being less than the AVE, and the square root of each variable's AVE exceeding its associations with other latent variables (Fornell & Larcker, 1981).

Table 4.1: Descriptive statistics, correlations, and discriminant validity index

	M	SD	CR	1	2	3	4	5	6	7	8
1. Sensation-seeking	2.71	0.57	0.893	*0.697*							
2. Lack of premeditation	2.01	0.47	0.903	0.175***	*0.736*						
3. Lack of perseverance	1.76	0.43	0.890	-0.092*	0.323***	*0.735*					
4. Urgency	2.05	0.52	0.922	-0.009	0.203***	0.257***	*0.775*				
5. PA	4.05	0.61	0.919	0.242***	0.003	-0.310***	-0.030	*0.769*			
6. NA	1.71	0.65	0.913	-0.072	-0.104**	0.121**	0.337***	-0.050	0.716		
7. Anticipated affect	6.01	1.29	0.714	0.178***	0.052	-0.086	-0.038	0.294***	-0.228***	*0.749*	
8. EL	5.73	0.86	0.893	0.206***	-0.054	-0.316***	-0.105**	0.386***	-0.142***	0.264***	*0.765*

Note: n=704; M=mean; SD=standard deviation; CR=Composite Reliability; The diagonal values (italicized) are the square root of the AVE.

† p < 0.1; * p < 0.05; ** p < 0.01; *** p < 0.001 (2-tailed).

4.5.2 SEM analysis

I next ran a series of nested models, comparing local and global model fit (refer to Table 4.2). As a more conservative test (Zhao et al., 2010), I first specified a partial mediation model (Model 1), which indicated good fit (x^2/DF=2.343, CFI=0.904, TLI=0.899, RMSEA=0.041, SRMR=0.051). Based on chi-square difference tests**,** Models 2, and 4-7 all exhibited significant decrements in global fit compared to Model 1–thus being excluded from further analyses. Model 3 included impulsivity-anticipated affect paths and was identical in global fit to Model 1. Thus, I compared local fit to determine which model to retain (Weston & Gore, 2006). The total variance explained in EL was 21.3% for both models. The paths from impulsivity to anticipated affect were non-significant for Model 3, while the paths from impulsivity to PA and NA remained significant. I thus retained the more parsimonious Model 1 as the baseline model (Model B). These results lend support for my theorizing that when simultaneously modeling both affect categories, current affect plays a key mediating role in the impulsivity-EL link, while anticipated affect–due to more impulsive individuals' weaker reliance on future-oriented thinking–does not mediate this relationship.

Table 4.2: Results of alternative model comparison

Models	χ^2	df	TLI	*CFI*	RMSEA	$\Delta\chi^2$	Δdf	*SRMR*
Model 1	3657.503	1561	0.899	0.904	0.041	–	–	0.051
Model 2	3688.096	1565	0.898	0.903	0.041	30.593***	4	0.054
Model 3	3657.503	1561	0.899	0.904	0.041	0	0	0.051
Model 4	3801.324	1566	0.892	0.898	0.042	143.821***	5	0.072
Model 5	3764.699	1566	0.894	0.900	0.042	107.196***	5	0.068
Model 6	3670.216	1562	0.898	0.904	0.041	12.713	1	0.052
Model 7	3749.305	1571	0.895	0.901	0.041	91.802***	10	0.066

*p<0.05; **p<0.01; ***p<0.005

Notes:

Model 1: Hypothesized model: Partial mediation and anticipated affect as an additional explanatory variable not related to impulsivity (impulsivity →anticipated affect→EL; anticipated affect→EL).

Model 2: Full mediation: direct paths from predictors to outcome removed.

Model 3: Anticipated affect added as a mediator (impulsivity→current affect→EL; impulsivity→anticipated affect→EL).

Model 4: Paths of Hypothesis 1 (impulsivity→PA→EL) were constrained to zero.

Model 5: Paths of Hypothesis 2 (impulsivity→NA→EL) were constrained to zero.

Model 6: Paths of Hypothesis 3 (anticipated affect→EL) were constrained to zero.

Model 7: Alternative causal path model (impulsivity→EL → affect)

4.5.3 LMS analysis

I finally estimated latent interaction terms for Model I. Having already established an acceptable Model B fit, according to Sardeshmukh and Vandenberg (2017), Model I should be compared to Model B in terms of AIC and log-likelihood values to determine whether there is a significant loss of information and hence poorer fit (refer to Table 4.3). Since the difference in AIC between the models was below 4 ($\Delta AIC = 113312.739 - 113315.042$) (Burnham & Anderson, 2002), and the log-likelihood ratio test demonstrated no significant information loss (*D*=9.698; ns) (Maslowsky et al., 2015), the hypothesized model with interaction effects provided an acceptable fit to the data (Sardeshmukh & Vandenberg, 2017). I thus analyzed the estimated model paths to test the hypotheses.

Table 4.3 contains the standardized coefficients[5] for all relationships included in my model. The results indicate that sensation-seeking is only significantly positively related to PA as a mediating mechanism (β=0.257, p<0.005), thus supporting *H1a*. Urgency (β=0.349, p<0.005) is positively, while lack of premeditation is negatively (β=-0.207, p<0.005), related to NA, while both impulsivity dimensions are not related to PA. Therefore, support is found for *H1b* and *H1c* respectively. Lack of persistence is positively related to NA (β=0.088, p<0.05), while negatively related to PA (β=-0.328, p<0.005), thus supporting *H1d*.

Table 4.3: Fit indices and standardized coefficients for baseline and interaction models

	Model B		Model I
Log-Likelihood	-56446.370		-56441.521
Estimated Paths[a]	210		216
D		9.698 NS	
Akaike Information Criterion (AIC)	113312.739		113315.042
Bayesian Information Criterion (BIC)	114298.337		114328.800
Sensation-Seeking→PA	0.256***		0.257***
Lack of Premeditation→PA	0.085		0.085
Lack of Perseverance→PA	-0.328***		-0.328***
Urgency→ PA	0.039		0.039
Sensation-Seeking→NA	-0.030		-0.032
Lack of Premeditation→NA	-0.207***		-0.207***
Lack of Perseverance→NA	0.088*		0.088*
Urgency→NA	0.349***		0.349***
Sensation-Seeking→EL	0.112*		0.110*
Lack of Premeditation→EL	-0.040		-0.045
Lack of Perseverance→EL	-0.176***		-0.165***
Urgency→ EL	-0.005		-0.013
PA→EL	0.234***		0.250***
PA^2→EL			0.019
NA→EL	-0.060		-0.129*
NA^2→EL			0.100*
AA→EL	0.136**		0.156*
AA X PA→EL			-0.037
AA X PA^2→EL			-0.009
AA X NA→EL			0.224*
AA X NA^2→EL			-0.102

Notes: D=Log-likelihood ratio test=-2[(log-likelihood for baseline model)-(log-likelihood for interaction model)]; AA=Anticipated Affect

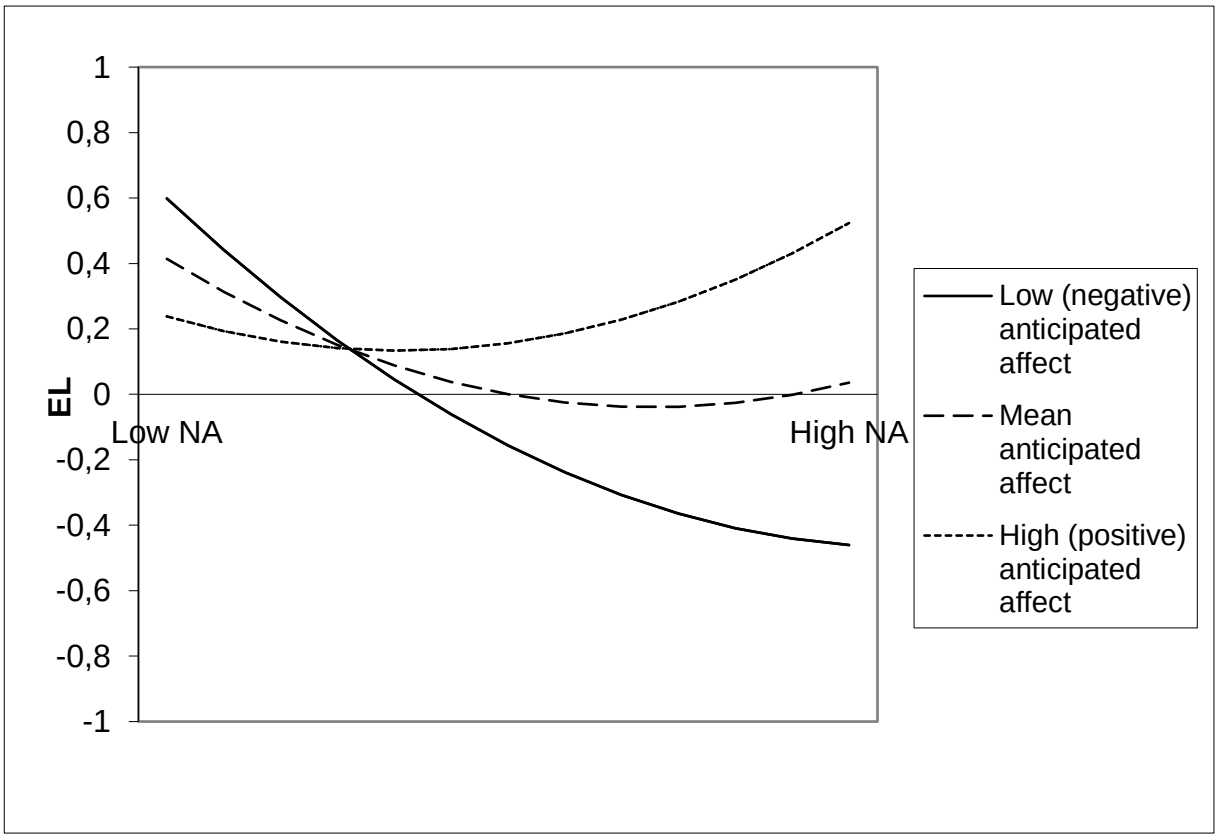
[a]Number of free parameters in the output.

*p<0.05; **p<0.01; ***p<0.005

In support of *H2a*, the linear effect of PA on EL is positive (β = 0.250, p < 0.005), whereas PA^2 is non-significant (β = 0.019, ns). This result indicates that a 1 SD increase in PA (0.61 scale points) leads to an increase in EL of 0.22 scale points (a 25% SD increase in EL). In support of *H2b*, NA has a significant and U-shaped (β2=0.100, p<0.05) relationship with EL. However, since the linear NA term is negative and significant (β1=-0.129, p<0.05), the U-shape relationship has a negative trend (Aiken et al., 1991). Consistent with my theorizing, both the interaction terms between anticipated affect and PA (β=-0.037, ns), and PA^2 (β=-0.009, ns) are non-significant. However, in support of *H4*, the interaction with NA is significant (β=0.224, p<0.05), while the interaction with NA-squared is non-significant (β=-0.102, ns). Figure 4.2 shows the pattern of the curvilinear NA term and the moderating effect of anticipated affect by plotting the simple main effects (Aiken et al., 1991) at high, mean

and low values of anticipated affect (for lack of a more meaningful theorized value, I employed 1.5 SDs above and below the mean following Dawson, 2014).

Figure 4.2: NA and EL as a function of anticipated affect



The mean anticipated affect curve of Figure 4.2 indicates that NA has a strong negative relationship with EL at low levels. That is, at low levels of NA, a marginal increase in NA leads to a decrease in EL. However, at moderate to high levels of NA, a marginal increase in NA results in an increase in EL. To illustrate, at high levels of NA (1.5 SDs above the mean; 2.69), an increase in NA of 0.65 scale points is associated with an increase in EL of 0.25 scale points (a 28.95% SD increase in EL). On the other hand, at low levels of NA (1.5 SDs below the mean; 0.74), an increase in NA of 0.65 scale points is associated with a decrease in EL of 0.77 scale points (an 89% SD decrease in EL). Yet, anticipated affect also influences this curvilinear relationship. Assuming mean levels of anticipated affect, the inflection point (point at which a marginal increase in NA increase EL) occurs at a standardized NA value of 0.645, well within the data range. This point shifts to a value of 2.325 and -1.035 for low and high levels of anticipated affect respectively, representing a statistically significant shift to the left ($p<0.05$), and further supporting my inflection point shift

hypothesis, *H4* (Haans et al., 2016). As illustrated by Figure 4.2, this result indicates that positive anticipated affect enhances the curvilinear NA-EL relationship by shifting the point of inflection towards lower levels of NA.

Hypotheses *3a-d* predicted relationships between impulsivity and EL through PA and NA. To test these indirect effects, I performed the recommended bootstrapping procedure (Hayes & Preacher, 2010) based on 1 000 bootstrap samples and a 95% bias-corrected confidence interval. Consistent with *H3a*, the indirect effect of sensation-seeking on EL through PA is positive and statistically significant (β=0.065; 95% CI=0.027, 0.098). *H3b* to *H3d* hypothesized nonlinear indirect effects through the nonlinear NA mediating mechanism. To test these effects, I estimated instantaneous indirect effects (θ)–a predictor's effect on an explanandum through a mediator(s) at a specified predictor value (Busse et al., 2016; Hayes & Preacher, 2010). This approach is required since if a predictor (X) is related to a mediator (M), which is nonlinearly related to an explanandum (Y), then the indirect effect of X on Y cannot be represented by a single value but rather is a function of X (Stolzenberg, 1980). θ is estimated by taking the first derivative of the function (the predictive equation for EL) with respect to X. Since EL is a composite function of impulsivity (i.e., there are multiple proposed mediators), θ is equal to the sum of the derivatives for each significant indirect path.[6] The theorized model (Figure 4.3) yields the following functions:

$$M_{positive\ affect} = i_{positive\ affect} + a_{1positive\ affect}X + e_{positive\ affect}$$

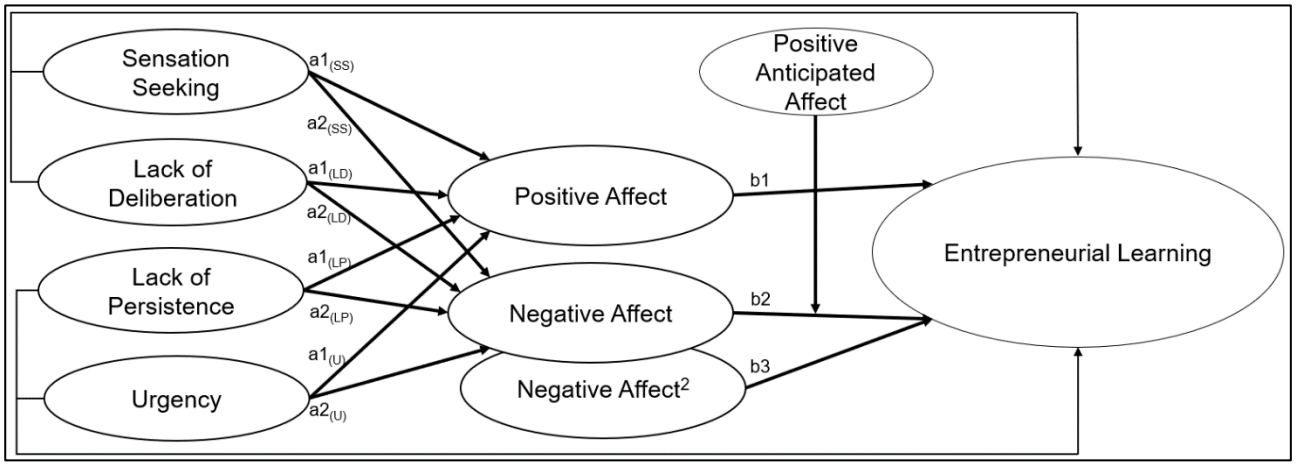
$$M_{negative\ affect} = i_{negative\ affect} + a_{2negative\ affect}X + e_{negative\ affect}$$

$$Y_{EL} = i_{EL} + b1M_{positive\ affect} + b2M_{negative\ affect} + b3M^2{}_{negative\ affect} + cX + e_{EL}$$

These functions enable the derivation of θ as:

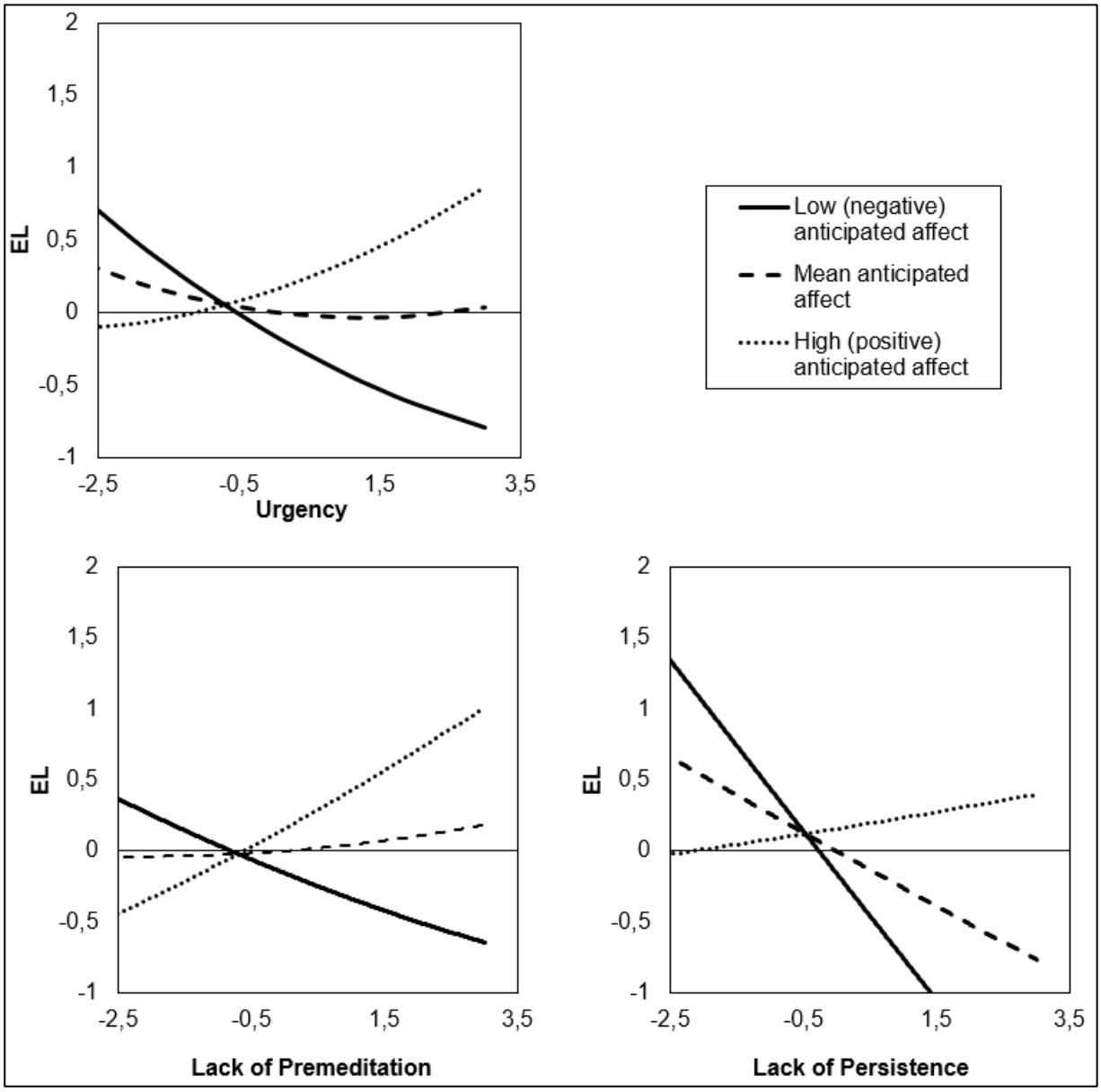
$$\theta = a_{negative\ affect}X\left(b2M_{negative\ affect} + 2\left(b3M^2{}_{negative\ affect}\right)\left(i_{negative\ affect} + a_{negative\ affect}X\right)\right) + \left(a_{positive\ affect}X\right)\left(b1M_{positive\ affect}\right)$$

Figure 4.3: Model testing the effects of impulsivity on EL via PA and nonlinear NA



I estimated θ at low and high values of each impulsivity dimension, with Δθ reflecting the curvilinear mediation effect size (Hayes & Preacher, 2010; Lin et al., 2017). Following Dawson (2014), I determined theoretically relevant values of "low" and "high" impulsivity as two SDs below and above the mean.[7] In support of *H3b*, θ for low, and high values of urgency were -0.134 (95% CI==-0.337, -0.034), and 0.011 (95% CI=-0.087, 0.058) respectively, with a significant Δθ of -0.145 (95% CI=-0.299, -0.012). In support of *H3c*, θ for low and high values of lack of deliberation were 0.011 (95% CI=-0.028, 0.030), and 0.061 (95% CI=0.003, 0.100) respectively, with a significant Δθ of -0.05 (95% CI=-0.193, -0.004). Finally, θ for low and high values of lack of persistence were -0.265 (95% CI=-0.442, -0.186) and -0.255 (95% CI=-0.424, -0.177) respectively, with a non-significant Δθ of -0.01 (95% CI=-0.035, 0.000). Since Δθ was non-significant, these results suggest that while PA and NA jointly transmit the indirect effect of lack of persistence on EL, this relationship is best interpreted as negative and linear. Thus, I do not find support for *H3d*. Although not hypothesized, I next explored the shifts in the plotted total indirect effects of urgency, lack of deliberation, and lack of persistence, on EL (Figure 4.4) as a function of the moderating effect of anticipated affect on the NA-EL pathway, based on equations from Edwards and Lambert (2007); and Hayes and Preacher (2010).

Figure 4.4: Total indirect effect and interaction plots



Consistent with *H4*, Figure 4.4 shows that the shape of the relationships (i.e., change in θ's) did not change as a result of the moderating effect of anticipated affect but exhibited inflection point shifts to the left. This shift results in the positive effects of each dimension on EL being exhibited from lower levels. Interestingly, even the total indirect effect of lack of persistence on EL (via PA and NA), which the results suggest is best interpreted as negative and linear, is ameliorated by this inflection point shift. An increase in positive anticipated affect shifts the direction of the linear indirect effect of lack of persistence from strongly negative (θ ranging from -0.601 to 0.591) to weakly positive (θ ranging from 0.071 to 0.081).

4.5.4 Robustness tests

Additional robustness analyses were conducted. First, I tested a cubic NA term and a PA-NA interaction term. Both terms were non-significant, ruling out these alternative explanations for the data (Haans et al., 2016). Second, I split the data into two sub-samples based on the inflection point for NA and tested two linear regressions. Significant negative and positive betas were found for sub-samples below and above the inflection point, respectively–supporting *H2b*. Third, I included an unmeasured latent method factor to assess common method variance (CMV). Factor loadings and structural coefficients remained substantively similar to the main analyses, suggesting CMV is not a significant threat in this study (Podsakoff et al., 2012).

Fourth, I tested for the presence of endogeneity between current affect and EL using the instrumental variable (IV) approach (Sande & Ghosh, 2018). Three IVs theorized[8] to meet the relevance and exogeneity conditions were employed: gender, average small business turnover by industry and provincial market size the respondent operates in (Bureau for Economic Research, 2016). Statistical tests indicated the relevance of the IVs: gender (β=0.-0.106, p<.01, Wald test>10) was a significant predictor of PA, while provincial market size (β=-0.093, p<.05) and average turnover (β=-0.116, p<.05) were significant predictors of NA (Wald test>10) (Anderson, 2018). Statistical tests indicated exogeneity: Sargan-Hansen test of overidentifying restrictions indicated no material misspecification (CMIN/DF<3.0), and no significant IV-criterion variable error term covariances were observed (Sande & Ghosh, 2018). Having met the conditions for effective IVs, I next systematically constrained each possible endogenous path to zero and conducted Hausman Tests for rejecting the null of exogeneity. Since assessing endogeneity in nonlinear relationships risks yielding inconsistent estimates (Haans et al., 2016), consonant with He et al. (2018), I focus only on linear paths here. These tests indicated endogeneity is not a significant concern (ΔChi-squared for PA=0.149, p=0.670; ΔChi-squared for NA=1.750, p=0.186), suggesting the observed current affect-EL link is reasonably robust against concerns of endogeneity (e.g., CMV and reverse causality).

Finally, I post-hoc assessed the veracity of the model in predicting performance and its robustness to variations in uncertainty and entrepreneurial experience. Twelve months after the first wave, these three variables were captured in a second wave of survey data from

respondents (n=213). Following the view that high EL should reflect in higher venturing performance (Frankish et al., 2013), particularly in terms of greater efficacy in meeting a market need (Harrison & Leitch, 2005; Ramoglou, 2021), respondents venturing effectiveness was captured using a five-item scale measuring sales, revenue, asset, employee, and market-share growth of respondents' principal venture (i.e., the one they engage with the most) relative to competitors (Powell & Eddleston, 2013). I included this measure as the final criterion variable in the model while controlling for venture size (number of employees), decision decentralization (Foss et al., 2013), and social desirability bias (Fischer & Fick, 1993) as factors that can impact EL and performance (Frankish et al., 2013). Furthermore, uncertainty is central to the theorized model, and the sample exhibited relatively high levels of entrepreneurial experience. Thus, I captured these two variables using a five-item environmental dynamism measure (Green et al., 2008) and the number of opportunities pursued by the entrepreneur, respectively and regressed current affect and EL on them to assess potential moderating effects.

This extended model showed acceptable fit (x^2/DF=1.514, CFI=0.871, RMSEA=0.047, SRMR=0.069), and all measures demonstrated acceptable composite reliability (>0.7) and discriminant validity (Fornell & Larcker, 1981). With all model paths remaining substantively similar to the original model,[9] I assessed the new paths. Bootstrapped estimates revealed that EL (β=0.197, p<0.05), PA via EL (β=0.057; 95% CI=0.016, 0.099) and NA via EL (β=-0.052; 95% CI=-0.101, -0.011), significantly predicted venturing performance. Further, sensation-seeking (β=0.013; 95% CI=0.002, 0.032) via the PA-EL pathway, urgency (β=-0.015; 95% CI=-0.032, -0.002) and lack of premeditation (β=0.010; 95% CI=0.001, 0.029) via the NA-EL pathway, and lack of persistence (β=-0.016; 95% CI=-0.037, -0.006) via the PA-EL but not the NA-EL pathway (β=-0.008; 95% CI=-0.026, 0.000), had a significant effects on performance. Overall, these results reinforce the veracity of the model in predicting a key outcome of EL. Next, I assessed potential moderating effects of uncertainty and entrepreneurial experience on all model pathways by testing each interaction term piecewise in LMS. Only one significant effect was found. While uncertainty did not moderate the effects of PA (β1=-0.012, p=0.885) or NA (β1=-0.106, p=235) on EL, it reduced the beneficial effects of positive anticipated affect (β1=-0.170, p<0.05) on EL. These results support this paper's theorizing that uncertainty attenuates reflective EL processes while also

suggesting robustness of the model to differences in entrepreneurial experience (as captured by volume of opportunities pursued).

4.6 DISCUSSION

This paper developed and assessed a model exploring the effects of impulsivity on EL. Supporting *H1a-d*, I find that impulsivity is related to PA and NA experienced in the moment. Sensation-seeking increases PA, urgency increases NA, lack deliberation decreases NA, and lack of persistence decreases PA and increases NA. Thus, sensation-seeking and urgency are, as per Whiteside and Lynam's (2001) definition, directly rooted in greater affective reactivity to uncertainty, while lack of premeditation reduces affective reactivity and lack of persistence has mixed effects. Supporting *H2a-b*, PA has a positive linear, while NA has a U-shaped effect on EL. Combining first- and second-stage effects, I find support for *H3a-c,* respectively: sensation-seeking is linearly related to EL via PA, while urgency and lack of premeditation have U-shaped relationships with EL via NA. Thus, consistent with my theorizing, sensation-seeking and urgency enhance EL via greater arousal of PA and NA, respectively. At moderate levels, however, urgency hinders EL through NA. While at low levels, urgency can be beneficial to EL, any marginal increase in urgency or NA at these low levels leads to a marginal decrease in EL. Similarly, lack of deliberation is only beneficial to EL at high levels. At low levels, any marginal increase in lack of deliberation or NA results in a marginal decrease in EL.

To illustrate, consider a cross section of entrepreneurs with a wide range of NA values. In this cross section, individuals with moderate NA underperform in terms of EL relative to those with low or high NA. Thus, entrepreneurs lacking deliberation appear to demonstrate a marginal increase in EL through decreasing NA from moderate to low levels. While not illustrative of the posited impulse-driven EL mechanism (greater affective arousal), this result indicates that lack of premeditation reduces the behavioral inhibition associated with moderate levels of NA, which benefits EL (Baumeister et al., 2007). Entrepreneurs high on urgency experience improved EL because the trait is associated with a marginal increase in NA, which at high levels, leads to a marginal increase in EL due to increased motivation to adapt behavior and renders one's state less unpleasant (Frijda et al., 2014).

The results suggest that lack of persistence does not have a U-shaped relationship with EL but is rather negative and linear. While lack of deliberation and urgency appear to exhibit direct effects on NA of sufficient strength to render curvilinear effects, the weak positive effect of lack of persistence on NA does not lead to high enough predicted values of NA to generate a curvilinear effect (i.e., lack of persistence predicts values of NA which only have negative θ's) (Hayes & Preacher, 2010). Thus, only sensation-seeking and urgency appear to activate current affect to a sufficient degree that greater attention and adaptation to present affordances are engendered (Frijda et al., 2014) which enhance EL (Baumeister et al., 2007).

Finally, *H4* is supported: anticipated affect positively moderates the U-shaped NA-EL relationship. This suggests that a positive affective forecast can ameliorate EL for those experiencing NA. This moderating effect extends to the indirect effects of urgency, lack of deliberation and lack of persistence on EL. For each of these impulsivity dimensions, the anticipation of positive affect increases motivation to change actions sooner, which ameliorates the indirect effects of each dimension on EL. These findings shed light on how and why impulsivity can impact EL, and how, at least for individuals lacking premeditation or persistence or high on urgency; their EL can be ameliorated through positive anticipated affect–suggesting the importance of this forward-looking, more deliberative factor in augmenting EL. I next discuss several noteworthy theoretical and practical contributions from these results.

4.6.1 Theoretical implications

First, by investigating the impulsivity-affect link, I begin to clarify the role emotion plays in impulsivity. It remains an open and important question as to the extent to which each of the distinct impulsivity dimensions are driven primarily by emotion versus an emotion-neutral lack of forethought (Berg et al., 2015). The observed results support the view that sensation-seeking and urgency are rooted in greater arousal of current affect in uncertain contexts (Whiteside & Lynam, 2001). Consistent with the view that lack of premeditation and persistence are associated more closely with a lack of intervention from executive control processes rather than per se being driven by heightened affective reactions (Carver & Johnson, 2018), I show that these impulsivity dimensions have dampening and mixed effects on affective arousal, respectively. As impulsivity-entrepreneurship research

burgeons (Pietersen & Botha, 2021; Walker et al., 2020; Wiklund et al., 2018), this paper demonstrates the validity of heterogenous conceptions of impulsivity that do not confine understanding of its etiologies to a single mechanism.

Second, I uncover a mechanism explaining how impulsivity impacts EL. While scholars have suggested (Lerner et al., 2018; Wiklund et al., 2017) and demonstrated (Pietersen and Botha, 2021) the value of less reasoned, more impulsive processing in increasing entrepreneurial action under uncertainty, it hitherto remained unknown *if* and *how* less reasoned approaches could reasonably lead EL. Impulsivity is generally associated with acting without forethought, in response to present feelings, and in a fast and error-prone manner (Lerner et al., 2017; Whiteside & Lynam, 2001). The trait is even considered by some to be a learning disorder (Brown, 2006; Walker et al., 2020). Thus, it is somewhat counterintuitive to associate it with enhanced learning (Williams & Dayan, 2005). I theorize and empirically demonstrate how impulsivity is of potential import to EL, while also demonstrating the veracity of the theorized model in predicting venturing performance 12 months later. Consistent with the rationalistic tradition, entrepreneurship scholars have assumed that reliance on current affect leads to hasty and careless actions which hinder EL (Baron et al., 2012; Corbett, 2007). Scholars have thus investigated ways to mitigate these effects through constructs such as emotion regulation (He et al., 2018), and taking a hiatus to allow emotions to settle and reflection to occur (Cope, 2011; Lattacher & Wdowiak, 2020). However, my results challenge this assumption and suggest that scholarly understanding of affect and EL in the entrepreneurial context should be tempered by a burgeoning understanding of the potential benefits of impulsivity and temporal discounting.

Third and relatedly, I offer some progress in response to the noted conceptual challenges of linking learning to entrepreneurship. In a context replete with unknowable uncertainty (Ramoglou, 2021), where feedback is often stochastic, bears little resemblance to prior feedback and presents only weak links to specific actions, it is not surprising that scholars have questioned whether there is *any* consistent basis for learning to occur (Frankish et al., 2013). My theorizing suggests that in this context, the only consistent anchor for learning may be uncertainty itself. While on the surface, single feedback events may seem vastly different, even stochastic, they are often linked by a common thread: they plunge the entrepreneur into a state of uncertainty regarding what to do next (Ramoglou, 2021). While,

at this point, reflective EL begins to collapse (as shown by my post-hoc moderation analyses), impulse-driven EL begins to make headway. For individuals high on certain impulsivity traits (i.e., sensation-seeking and urgency), uncertainty automatically and non-consciously evokes a heightened affective response (Leland et al., 2006) that stimulates approach or avoidance reactions, based on affordances presented in the moment (Baumeister et al., 2007), to improve the hedonic valence of the immediate situation (Frijda et al., 2014). It is these *ad hoc*, temporally discounted reactions which appear to enhance EL among impulsive individuals. Rather than more rigidly following some ultimate teleology which may be *ex ante* unknowable, or at best, may be imperfect and fallible (Alvarez & Barney, 2007; Sarasvathy, 2001), these individuals can generate quicker responses to impending decisions (Knutson & Greer, 2008) and thus more flexibly adapt to the uncertain and dynamic learning context. At the extreme of no outcome uncertainty, all events will occur as predicted, and thus no new information is produced by immediate feedback (i.e., it is redundant; Fiorillo et al., 2003). At the other extreme is true Knightian uncertainty which itself implies that an accurate predictor of any desired entrepreneurial state is unavailable, and therefore, there is always useful information and value in adapting to immediate feedback events (Bulley et al., 2016; Williams & Dayan, 2005). It is this more impulsive-driven, reactive approach, which my model, consistent with neuroeconomic research (Fiorillo et al., 2003; Williams & Dayan, 2005), suggests is beneficial to EL.

Nevertheless, incumbent EL research remains decidedly reasoned, and in acknowledging the value thereof, I take a default-interventionist stance to illustrate how more reflective processing may intervene in the model. I find that positive anticipated affect enhances EL and can also ameliorate the impulsivity-EL relationship. By forming a more coherent representation of a desired future state in an individual's mind, enabling planning, reflection, and the generation of knowledge, which has potential future emotional relevance (Anderson et al., 2009), positive anticipated affect appears to attenuate the behavioral aversion evoked by NA (i.e., it makes one more willing to change their behavior if they anticipate positive emotional consequences from their efforts; Baumeister et al., 2007).

Thus, while acknowledging the value of reasoned reflection to EL, I show that efforts to anchor EL research solely to reasoned, reflective processes will inherently underplay the more emotion laden, less reasoned processes which permeate EL. A more reflective stance

elevates teleology, the imagined future opportunity, to the status of ultimate judge regarding current actions and EL (Wood et al., 2021a). However, my study responds to the call for a more entrepreneurship-friendly conception of EL, specifically and time in the entrepreneurial process generally (Van Lent et al., 2021)–a broader conception in which *present* feelings, desires and affordances are also relevant and can guide adaptive entrepreneurial behavior regardless of any *future* goal (Bulley et al., 2016; Williams & Dayan, 2005). As such, I advance the EL literature beyond the confines of the rational perspective inherited from organizational learning theories (Politis, 2005; Wang & Chugh, 2015) while simultaneously contributing to a growing body of research aimed at unpacking the role of less reasoned processes in the entrepreneurial context (Lerner et al., 2021; Lerner et al., 2018; Nair et al., 2020; Van Lent et al., 2021).

Finally, emerging research suggests that in contrast to the documented negative implications of impulsivity in traditional workplace contexts (Berg et al., 2015; Sharma et al., 2014), entrepreneurship is distinct and may uniquely benefit the impulsive (Wiklund et al., 2017). Yet, links between impulsivity and venturing performance have been mixed (Greidanus & Liao, 2021; Lerner et al., 2021; Patel et al., 2021). I partly clarify these effects through EL. EL is essential for effective opportunity development (Aldrich & Yang, 2014; Franco & Haase, 2009) and drives (as shown by my robustness test) venturing performance (Politis, 2005). Thus, although impulsivity may increase behavioral and performance volatility (Lerner et al., 2021), I illustrate that this may ultimately enhance venturing performance via improved EL under uncertainty. I partly identify this effect by extending investigations of the impulsivity-entrepreneurship link toward more complex, nonlinear relationships. Had I not investigated the curvilinear effect of NA on EL, I would have invariably inferred that impulsivity and NA have a negative effect on EL, while the results suggest the opposite is possible. Thus, by (1) moving toward a more nuanced view that impulsivity is not unequivocally good or bad but depends on the level at which the traits are expressed (Busse et al., 2016), and (2) investigating EL as a key element of effective opportunity development, I deepen insight into the role played by impulsivity in entrepreneurship.

4.6.2 Practical implications

This paper also has implications for entrepreneurs and their educators. Most entrepreneurship education interventions espouse highly reflective EL approaches by suggesting entrepreneurs should formulate pre-defined entrepreneurial opportunities, deliberately reflect on progress, and control actions to navigate toward them using tools like business plans and milestone metrics (Ahsan et al., 2018; Brush & Noyes, 2012). Yet, by showing the merit of impulse-driven EL, my results suggest these interventions may deemphasize the importance of being adaptive and reactive to present affordances as opposed to more rigidly trying to navigate to an imagined future that may be *ex ante* unknowable. Thus, while both approaches benefit EL, I encourage entrepreneurs and their educators, particularly those operating in contexts of extreme uncertainty, to be aware of the limitations to reflective EL. Immediate events have meaning beyond their relation to some future temporal beacon, and focus should be given to the heightened affective reactivity to these events as a valuable EL input. This broadened perspective represents a promising, under-addressed avenue for practically enhancing navigation of the more nebulous and impulsive nascent stages of venture emergence (Nair et al., 2020).

In addition, a core activity for entrepreneurs should be to manage their affective levels to maximize EL. While the benefits of sensation-seeking through PA appear linear, the impact of the other impulsivity dimensions through NA are more complex. Since affect experienced in the moment is relatively amenable (Frijda, 2010) using tools, such as shifting interpretations of a situation to modulate affective valence and activation (Baron et al., 2012), entrepreneurs and educators should aim to manage their affective response, particularly when negative. Furthermore, these effects can be ameliorated through positive anticipated affect. My research suggests that individuals prone to experiencing low to moderate levels of NA should be encouraged to consider and anticipate possible positive affective outcomes, as this should motivate adaptive behavior sooner. Indeed, research suggests that affective forecasting can alter decision-making in emotionally-charged contexts, and the techniques shown to be effective for this purpose, such as mental simulation of affective consequences (Bulley et al., 2016), may prove useful to entrepreneurs seeking improved EL.

4.7 LIMITATIONS AND FUTURE RESEARCH

As with all studies, this study has limitations that call for future research. First, I relied on self-report data. To mitigate this limitation, I validated the model in terms of predicting a key outcome of EL (venturing effectiveness). Yet, self-report measures remain subject to retrospective recall and CMV, which must be acknowledged. Second, although I undertook several *ex ante* and *ex post* steps to reduce concerns of endogeneity (including CMV), my cross-sectional survey design does not allow one to fully rule out these effects. Nevertheless, this paper offers a promising and cogent initial foray into the impulsivity-EL link, which should stimulate future research to consider more objective measures of EL and employ experimental approaches to more fully test the veracity of the causal mechanisms through which impulsivity impacts EL.

Third, it is important to recognize that while the theorized impulse-driven EL approach meaningfully explains a portion of EL, there are likely several factors further impacting EL and perhaps moderating the theorized effects (e.g., resources available to adapt appropriately, career experience and interests; Politis, 2005). Notwithstanding the importance of these other factors, the aim of this paper is to begin to understand how impulsive-driven learning processes work rather than maximally explaining the variance in EL. To this end, the results of this paper indicate that the theorized model is meaningful and should be considered an important element of EL to be investigated further. Fourth, the theorized model is only predicted to apply in conditions of uncertainty, where there is utility in a more impulsive-driven, reactive approach to immediate feedback events (Bulley et al., 2016; Williams & Dayan, 2005). In more predictable conditions, more reflective learning approaches are likely more appropriate (Fiorillo et al., 2003; Williams & Dayan, 2005), and the heightened states of current affect are unlikely to be elicited to a sufficient degree anyway (Frijda et al., 2014). However, since uncertainty is relatively persistent throughout the entrepreneurial process (Ramoglou, 2021), and robustness tests revealed the model was reasonably robust to variations in uncertainty in this context, the model should apply to a range of entrepreneurial pursuits which exhibit at least some level of uncertainty.

Fifth, although this paper retrospectively captures EL using a cross-sectional design, it is important to recognize that EL is a dynamic process which occurs over time (Politis, 2005). While research has illustrated the retrospective EL scale as valid and reliable measure of

one's proficiency at generating knowledge from feedback and using it to adapt actions for a better result (Anderson et al., 2009), future research would benefit from longitudinal designs which can capture the more dynamic elements of EL. Finally, I relied on a sample of relatively experienced entrepreneurs to test my model. While the robustness tests show that the hypothesized model is reasonably robust to differences in opportunity pursuit experience, caution should be applied in attempting to extend the results to nascent entrepreneurs. Since research suggests that domain-specific experience may enhance impulsive outcomes by improving the affordances perceived in the domain (Frijda et al., 2014), future research should explore whether my model could viably extend to nascent entrepreneurs who may lack the requisite affordances.

4.8 CONCLUSION

Despite the "unbearable elusiveness" (Dimov, 2011) of accumulating appropriate *ex ante* knowledge regarding an opportunity to guide one's actions, the focus of EL research, perhaps mirroring the entrepreneurship field more broadly (Lerner et al., 2018), has remained reflective. While the imagined future opportunity has been viewed as a temporal beacon through which reasoned, reflective EL occurs (Wood et al., 2021b), I illustrate the relevance of an impulse-driven approach, where adaptivity in the present is rendered more salient and deliberate information processing regarding future goals is negligible (Lerner et al., 2018; Van Lent et al., 2021). By uncovering this more impulse-driven approach to EL, I challenge the pervasive reasoned reflection paradigm of EL and begin to open the door for future research inquiry into this theory-expanding alternative.

4.9 ENDNOTES

[1]I use the term "state" affect as it is event generated. Trait impulsivity impacts one's affective state in the specific event of opportunity pursuit. Nevertheless, research indicates that, in many domains state and trait affect produce equivalent effects (Baron, 2008; Lyubomirsky et al., 2005).

[2]The psychophysiological response depends on the consequence produced and not on the affect valence (Hall et al., 2011). That is, each affect valence can stimulate either approach or avoidance reactions (Baumeister et al., 2007). The reaction depends on whether the action renders one's relation to an event more or less (un)pleasant (Corr & McNaughton,

2012; Frijda et al., 2014). To illustrate, heightened PA (NA) elicits an innate approach response when affordances offer an opportunity to produce PA (prevent NA), while eliciting an innate response to avoid when these affordances prevent PA (produce NA) (Corr & McNaughton, 2012; Hall et al., 2011).

[3]The analyses without controls yielded substantively similar results.

[4]I re-estimated the model using a 16-item short UPPS scale (Cyders et al., 2014). Model fit, measure reliability, validity, and structural paths were equivalent to the main analyses, showing the model is robust to variations in impulsivity measurement (Wiklund et al., 2017).

[5]Since LMS does not generate standardized coefficients, the data were standardized prior to analyses (Klein & Moosbrugger, 2000; Maslowsky et al., 2015).

[6]θ can also include the direct effect of X on Y. However, since the aim is to understand how processes work rather than establishing existence of a total effect, I focus on indirect effects. Nevertheless, direct effects were only found for sensation-seeking and lack of persistence, and including them in the estimation of θ would not have substantively changed the results.

[7]Research indicates that at approximately these levels of each impulsivity dimension, disorders, such as attention deficit/hyperactivity and pathological gambling become observable (Miller et al., 2010; Whiteside et al., 2005), suggesting a theoretically meaningful value for my analyses. However, using 1.5 SDs as the interval value leads to substantively similar inferences.

[8]Due to differences in neuroticism and extraversion, gender is linked to differences in affective experience generally (Brody & Hall, 2008) and in entrepreneurship, specifically (Dempsey & Jennings, 2014), while not linked to differences in cognitive ability or learning proficiency (Ruffing et al., 2015). Average small business turnover by industry and provincial GDP indicate domain resource munificence which likely influences one's affective experience of entrepreneurship (Morris et al., 2012). Following prior research (Liu et al., 2019), I do not expect these macro-level variables to systematically relate to one's learning proficiency.

[9]While I assessed the NA-squared term using LMS, the effect was non-significant. This is likely due to the second-wave sample not exhibiting a sufficient range of NA values to demonstrate a curvilinear effect. While the predicted inflection point was at an NA value of 2.325 (0.645 SDs above the mean), only 23 second-wave respondents exhibited NA above

this value. Thus, I focus on linear indirect effects to assess the overall predictive validity–regarding EL outcomes–of the theorized model rather than assessing nonlinear effects.

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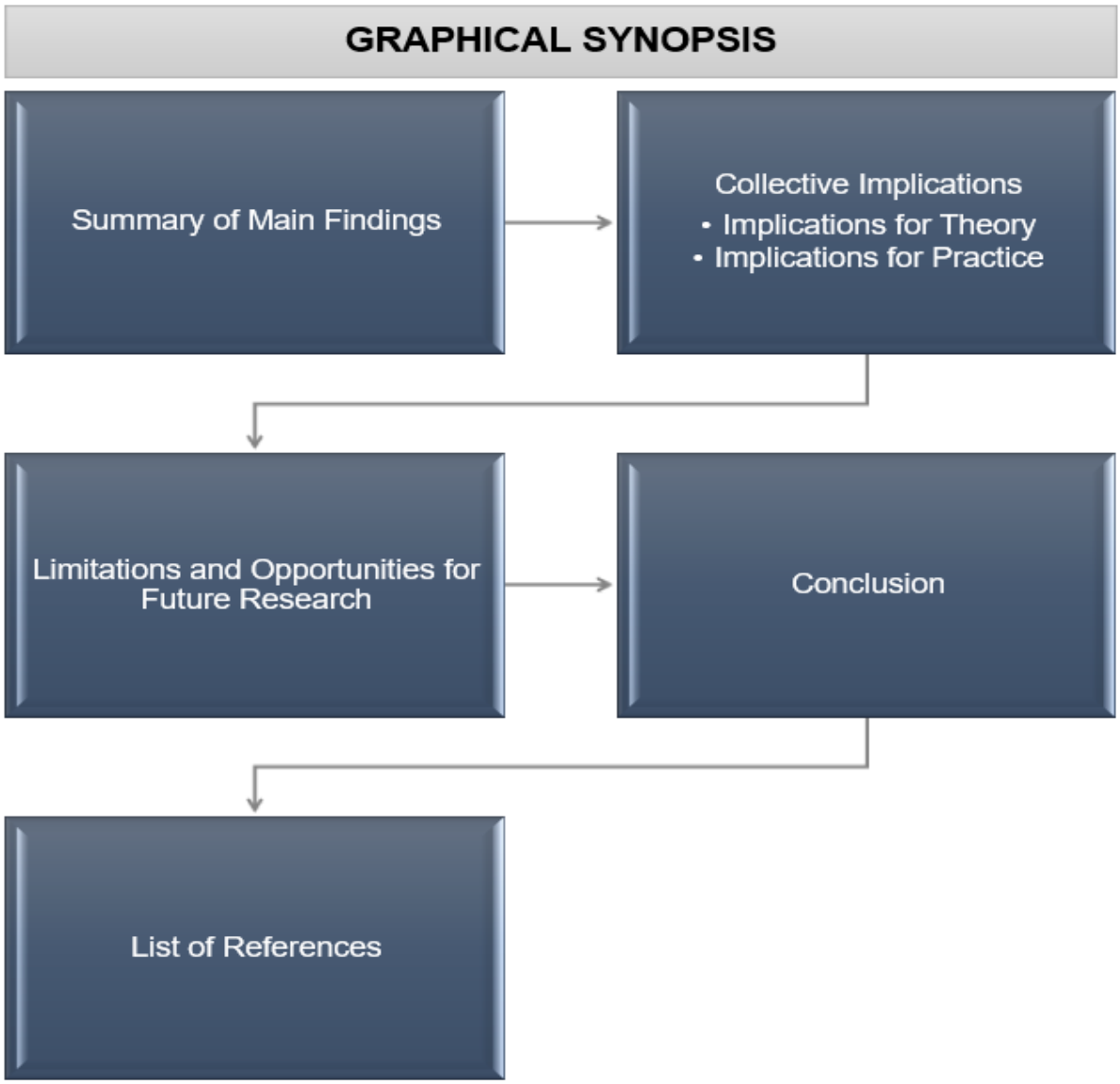
CHAPTER 5:

SUMMARY OF MAIN FINDINGS, IMPLICATIONS AND CONCLUSION



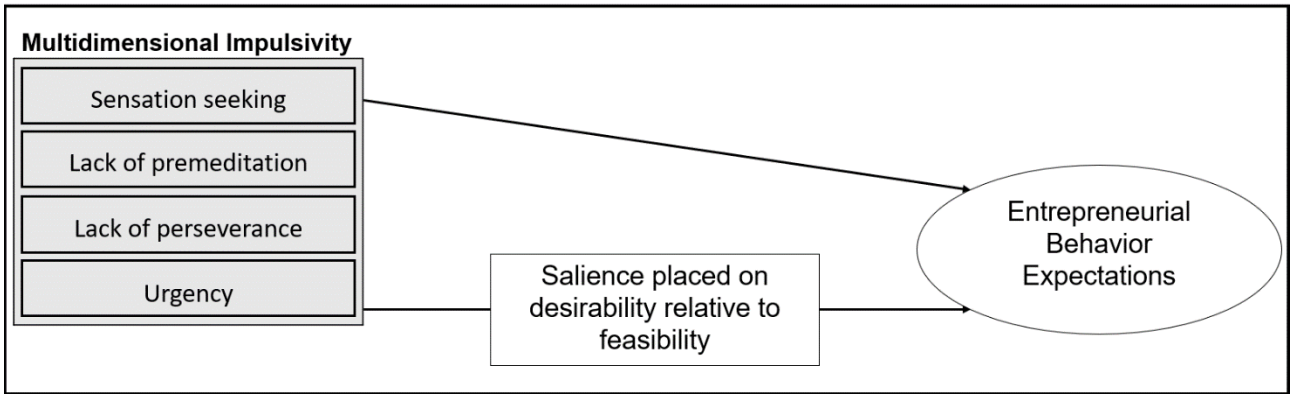
Chapter 5 summarises the main findings of this TBP. Since this TBP presents three distinct papers developed for publication in accredited academic journals, the central aim of the fifth chapter is to illustrate the overarching implications and conclusions that can be drawn from the three papers collectively. As illustrated in the graphical synopsis, this chapter offers an overarching summary of the results, collective implications for theory and practice emerging from these results, a discussion of some overall limitations and concomitant future research directions, and a conclusion of the TBP.

5 SUMMARY OF MAIN FINDINGS

This TBP aimed to rigorously investigate an unreasoned perspective in entrepreneurship by theorising and testing mechanisms that explain *how* impulsivity impacts three entrepreneurial outcomes central to the emergence of new economic ventures: entrepreneurial behaviour (McMullen & Shepherd, 2006:132), the quality of idea pursued (Vogel, 2017:943), and entrepreneurial learning (Wang & Chugh, 2015:13). Across three separate papers and several studies, this TBP built theoretically grounded, empirically robust models explaining how impulsivity affects these important entrepreneurial outcomes through a (lack of) reasoning processes lens.

Article 1 aimed to address research objective 1: Explore the extent to which impulsivity impacts entrepreneurial behaviour and what mechanism, from a cognitive perspective, explains this effect. Figure 5.1 illustrates the theorised model developed and tested in response to this objective. It was hypothesised and found that certain dimensions of multidimensional trait impulsivity exert a positive effect on one's expected probability of acting entrepreneurially and the entrepreneurial action (i.e., behaviour) actually undertaken 12 months later. A lack of reasoning, captured through a novel measure of the salience an individual places on the desirability versus feasibility of an entrepreneurial opportunity, was hypothesised and found to be a critical pathway explaining these effects. In so doing, this paper shows that a material portion of entrepreneurial behaviour can emerge via a less reasoned pathway.

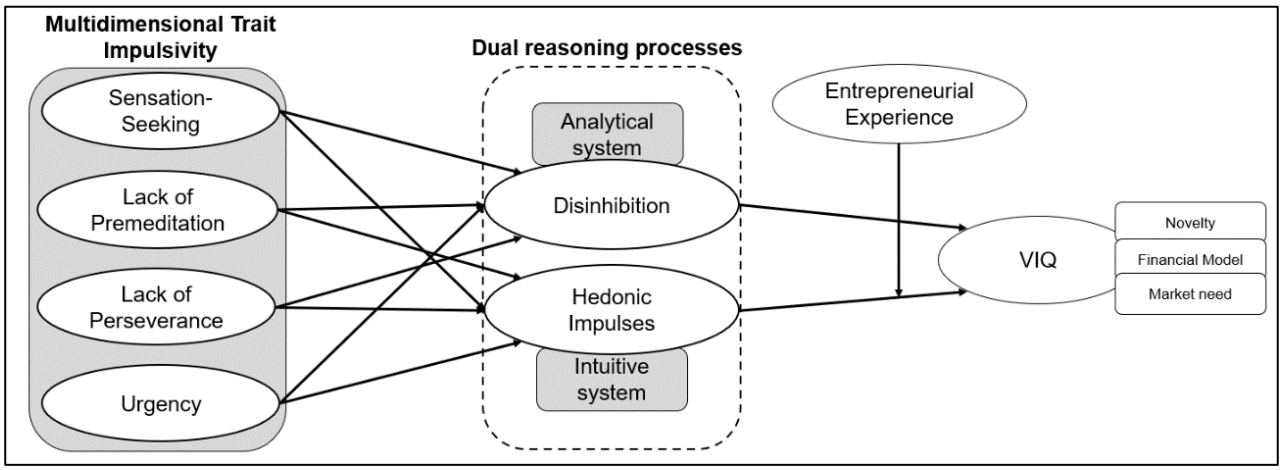
Figure 5.1: Article 1 hypothesised model



Source: Adapted from Pietersen and Botha (2021:1-19).

Paper 2 aimed to address research objective 2: Given the theorised lack of reasoning and increased entrepreneurial behaviour associated with impulsivity, explore the impact of impulsivity on the quality of first- and third-person venture ideas and the cognitive mechanisms explaining this effect. Figure 5.2 illustrates the theorised model developed and tested in response to this objective. It was hypothesised and found that multidimensional trait impulsivity exerts mixed effects on venture idea quality depending on the reasoning processes evoked. Impulsivity traits that increase emotion-neutral disinhibition hinder idea quality, while impulsivity traits that increase emotion-driven hedonic impulses enhance idea quality. In so doing, this paper provides nuanced insight into the effects of reasoning on venture idea quality. As a counterweight to the predominant rational-analytic reasoning logic assumed in the literature, this paper illustrates a broader panoply of impulsiveness, which begins to illuminate why some individuals, but not others, are willing to act on novel, potentially highly profitable, but uncertain venture ideas.

Figure 5.2: Paper 2 hypothesised model

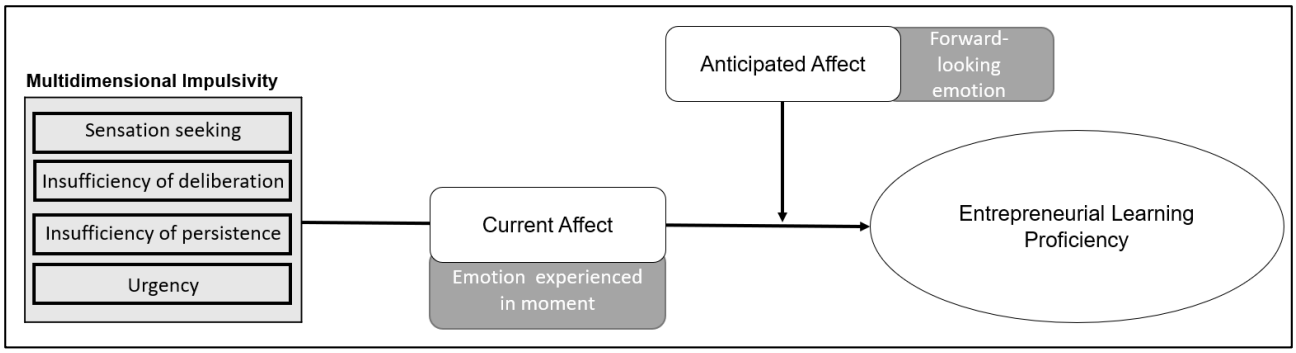


Source: Adapted from Paper 2.

Paper 3 aimed to address research objective 3: Given impulsive individuals' predicted higher levels of entrepreneurial behaviour (engagement) and potentially lower levels of idea quality, explore the extent to which impulsivity impacts the ability to learn from engagement in the entrepreneurial context and the cognitive mechanisms explaining this effect. Figure 5.3 illustrates the theorised model developed and tested in response to this objective. It was hypothesised and found that certain dimensions of multidimensional trait impulsivity exert a positive effect on entrepreneurial learning, where positive and negative affect experienced in the moment are key mechanisms explaining these effects. The forecasting of positive

affective consequences–a more reasoned and deliberative dimension of affect–was hypothesised and found to be a moderator that can augment these effects. This paper accordingly provides nuanced insight into the effects of reasoning on entrepreneurial learning and challenges the fundamental assumption that entrepreneurial learning is teleologically-driven and reflective, rather than affective and impulse-driven (Lerner, Hunt & Dimov, 2018c:52).

Figure 5.3: Paper 3 hypothesised model



Source: Adapted from Paper 3.

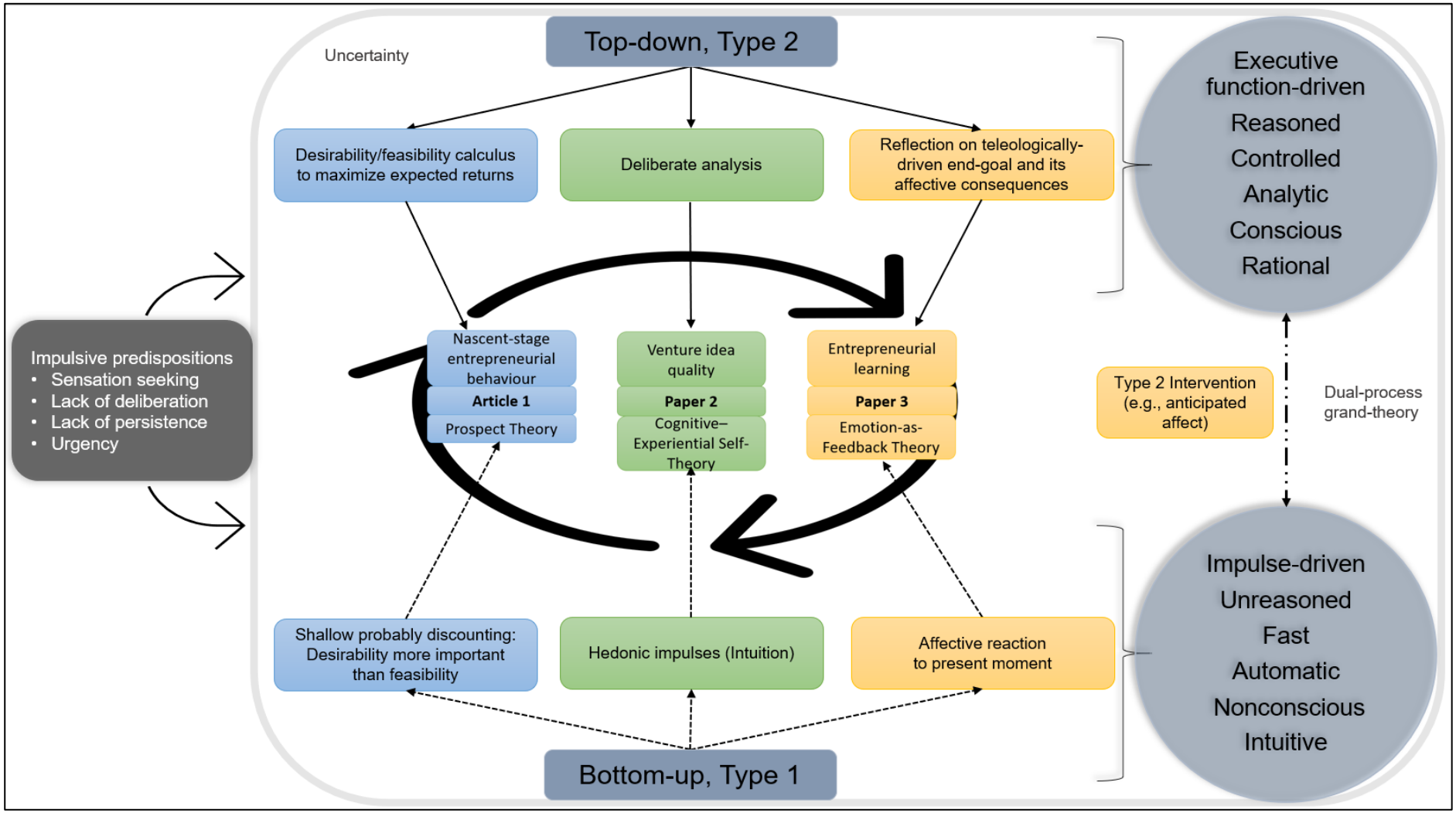
In summary, the evidence derived from this TBP suggests that impulsivity, through a lack of deliberate reasoning (more broadly termed impulsiveness in Paper 2), exerts an indelible force on the entrepreneurial process. Consistent with the view of impulsivity as a heterogenous, umbrella construct designed to capture a broad range of impulsive aetiologies (Whiteside & Lynam, 2001:669), this TBP shows that attempts to generate uniform predictions for all impulsivity dimensions may be too simplistic (Wiklund, Yu & Patzelt, 2018b:379). Nevertheless, this TBP suggests that reasoning mechanisms of probability discounting (Article 1), temporal discounting (Paper 3), and more general dual-processing (Paper 2), provide useful and enlightening ways of accounting for the effects of impulsivity in entrepreneurship.

As a result, the findings provide empirical support for the emerging work suggesting impulsivity, in contrast to its aberrant effects generally, can actually be relevant and have utility in entrepreneurship (Wiklund *et al.*, 2017:627). Thus, attempts to confine the entrepreneurial process to only that which is positive and rational *ex ante* will inevitably constrain a fuller understanding of entrepreneurial phenomena which is of key relevance to the field (Hunt & Lerner, 2018:2352). Revisiting the overarching research purpose and

structure of this TBP, Figure 5.4 illustrates the dual-process grand-theory employed to guide explication of the basic processes underlying reasoning (Hodgkinson & Sadler-Smith, 2018:474-475) in relation to the three investigated entrepreneurial outcomes. This dual-process lens, and the supporting evidence in this TBP, allows one to deduce that it is useful to distil entrepreneurial cognition into the dual processing Types to account for *both* the reasoned and rational, as well as the less reasoned (Hunt & Lerner, 2018:6), more nebulous drivers of entrepreneurship (Nair et al., 2020:12). Article 1 offers a precise descriptive account of how impulsiveness deviates from Type 2 reasoning and involves unreasoned processing. However, the unidimensional scale used in this article and derived from behavioural economics (PT) (Sanfey, Loewenstein, McClure & Cohen, 2006: 108; Tversky & Kahneman, 1992:297), while being useful in illustrating a deviation from Type 2, top-down reasoning, remains unable to disentangle whether these effects are predominantly due to a *lack* of top-down analysis, or due to *heightened* Type 1 hedonic impulses. That is, although Article 1 allows for the possibility that the dual process operate simultaneously, the unidimensional scale cannot unpack the respective roles of each processing Type in determining behaviour (refer to section 3.8, page 113, for an example). In this regard, Paper 2 offers insight into the respective roles of each processing Type, and how the dual processes can operate in parallel when acting on venture ideas. Relatedly, Paper 3, in acknowledging the benefits of unpacking the a dual processes to consider their co-occurance, goes further to explore how Type 2, reflective processing may intervene to potentially enhance Type 1 processing.

Thus, not only do the collective papers in this TBP challenge the fundamental rationality assumption in entrepreneurship, they also develop clearer and more unified knowledge (Saad, 2017:472) of the reasoning mechanisms underlying key entrepreneurial phenomena. Entrepreneurial behaviour, venture idea quality, and entrepreneurial learning are not entirely governed by intendedly rational, Type 2 conscious forethought. Rather, these phenomena are also explained by less reasoned processes which can be accounted for within a unified dual-processing framework. At an even deeper level, these less reasoned processes can emerge, not just through a lack of deliberate Type 2 thought, but also from more hedonic (Paper 2) and emotive (Paper 3), Type 1 drivers. These results carry a range of implications for developing an unreasoned perspective, alongside the vast literature from a rational perspective, in entrepreneurship theory and practice.

Figure 5.4: Overarching TBP structure: Investigating mechanisms which explain how impulsivity impacts three important entrepreneurial outcomes



Source: Own compilation.

5.1 COLLECTIVE IMPLICATIONS

Each paper has several distinct implications for entrepreneurship theory and practice, which are articulated therein. Rather than reiterating these distinct implications, a synopsis of the theoretical and practical insights emerging from collective consideration of the papers is appropriate.

5.1.1 Implications for theory

First, **Article 1 and Papers 2 and 3** collectively provide compelling evidence that incumbent entrepreneurial action theorising, which has–at its foundation–taken a rationalistic stance (e.g., McMullen & Shepherd, 2006:135), is inadequate and ought to be augmented to include less reasoned precursors (Lerner *et al.*, 2018c:52). While underscoring the relevance, even the necessity, of rational analysis, **Article 1** reveals that a deviation from rationality can, and does, occur in pursuit of an entrepreneurial opportunity. Drawing from the formal and rigorous reasoning frameworks in behavioural economics (PT) (Sanfey et al., 2006:108 ; Tversky & Kahneman, 1992:297), Article 1 proffers a precise mechanism, grounded in theory, demonstrating a substantive portion of entrepreneurial behaviour is unreasoned. In so doing, Article 1 provides some progress towards capturing (Hunt & Lerner, 2018:1), and incorporating an unreasoned perspective in theories of entrepreneurial action (McMullen & Shepherd, 2006:132; Schlaegel & Koenig, 2014:291). While further illustrating the value of rational analysis, **Paper 2** extends Article 1's line of thought to better untangle two distinct impulsive pathways, which differ in their effect on venture idea quality. Extending beyond the boundaries of expected utility presented in Article 1, Paper 2 draws from CEST (Epstein et al. 1996:390) to challenge unitary conceptions of entrepreneurial action on a spectrum from comprehensively analysed to disinhibited. As a result, Paper 2 furthers theoretical understanding of how impulsiveness and rational analysis could reasonably co-exist in enhancing action on high-quality venture ideas. Again, while demonstrating the importance of rational analysis, **Paper 3** extends Papers 1 and 2 by drawing from EFT (Baumeister, Vohs, Nathan DeWall & Zhang, 2007:167) to challenge the view that entrepreneurial learning requires Type 2 teleological and reflective thought (Wang & Chugh, 2015:11), as opposed to Type 1 affective and impulse-driven action. This Paper shows how the concepts of temporal focus and discounting matter in understanding the role of reasoning in entrepreneurship. Collectively, this TBP thus contributes noteworthily toward revealing a more impulse-driven perspective and eschewing reliance on the mainstream a rational-

economic perspective in entrepreneurship (Dew, Read, Sarasvathy & Wiltbank, 2008:40; Huang & Pearce, 2015:640). By avoiding circumscribing entrepreneurship theory to a reasoned, "judgement-then-action" perspective, this TBP advances entrepreneurship theory towards an account that is more consistent with the emerging empirical reality that entrepreneurial behaviour and outcomes also arise from less reasoned precursors (Hunt & Lerner, 2018:6).

Second, **Article 1 and Papers 2 and 3** collectively advance entrepreneurship theory in terms of precisely pinpointing the most basic, nascent-stage motivations, cognitive mechanisms and actions that ultimately lead to the emergence of new economic ventures (Dimov, 2011:57; Lerner *et al.*, 2018c:66). Such an investigation is noteworthy as an exploration of these nascent-stage cognitive mechanisms and actions represent one of the strongest arguments for entrepreneurship as a distinct field of study rather than one which is absorbed within fields such as economics or strategy (Lerner *et al.*, 2018c:66; Wiklund, Davidsson, Audretsch & Karlsson, 2011:1-4). Although there is a vast body of knowledge, inherited from the fields of economics and strategy (among others) (Hodgkinson & Healey, 2011:1507), to understand rational, rule-based and predictive action; such formalisation of entrepreneurial behaviour generally occurs at later stages of venture development (Lerner *et al.*, 2018c:52; Shepherd, 2015:489). Entrepreneurship scholars are largely on their own when it comes to grasping the most nascent stages of venture emergence, where initial actions, motivations and ideas are invariably more idyllic, unplanned, nebulous, impulsive, autonomous, and unreasoned (Nair, Gaim & Dimov, 2020:1; Van Lent, Hunt & Lerner, 2021:1; Yang & Aldrich, 2012:477). To this end, **Article 1** offers an unreasoned account of initial entrepreneurial behaviour, **Paper 2** demonstrates the effects of dual impulsive processes on idea quality, and **Paper 3** distinguishes between reasoned versus impulse-driven affective drivers of entrepreneurial learning. Since all three of the models in these papers are predicated on basic, bottom-up neuro-biological processes of impulsivity (Carver, 2005:315; Sharma et al., 2014:374; Whiteside & Lynam, 2001:685), this TBP contributes towards uncovering the basic psychological and cognitive origins of new venture emergence, before formalisation, conscious intentionality, and rational, rule-based actions take hold (Lerner *et al.*, 2018c:56; Shepherd, 2015:495; Townsend *et al.*, 2021:19). Moreover, beyond the entrepreneurship literature, the emerging recognition that formal organisational strategy requires individual-level entrepreneurial thinking (Demil, Lecocq,

Ricart, & Zott, 2015:3) indicates broader relevance of this TBP to the field of strategy in terms of understanding the individual-level cognitive microfoundations underlying the creation of new economic value (Bingham, Howell, & Ott, 2019:122).

Finally, **Article 1 and Papers 2 and 3** collectively advance a more holistic understanding of the impulsivity-entrepreneurship link. In Chapter 1, it was proposed that entrepreneurial behaviour and idea quality are closely interrelated; the willingness to engage in entrepreneurial behaviour under uncertainty affects idea quality, and idea quality affects this behavioural willingness (McMullen & Shepherd, 2006:132). Indeed, Paper 2 (Chapter 3), confirms this prediction. Although the field study of Article 1 demonstrates increased entrepreneurial action under uncertainty via a lack of reasoning, Paper 2 adds nuance to this finding by showing that this may depend on context. In real-life contexts, a lack of regard for the consequences will result in increased entrepreneurial action in aggregate. However, Paper 2 illustrates that when presented with the same context and technological enabler of venture creation, entrepreneurs can adapt the idea itself, rather than inhibiting action based on the uncertainty faced. Additionally, Paper 3 shows how impulsivity can drive entrepreneurial learning. Since learning is essential to understanding how entrepreneurs navigate the entrepreneurial process (Aldrich & Yang, 2014:59; Franco & Haase, 2009:629; Politis, 2005:399; Wang & Chugh, 2015:11), Paper 3 illustrates how impulsivity might vary in its impact on entrepreneurial behaviour and idea quality over time. Even though certain impulsivity traits may drive entrepreneurial behaviour (Article 1) on poorly conceived, fatally flawed venture ideas (e.g., sensation-seeking; Paper 2), the impulsivity traits appear to drive an entrepreneurial learning approach which helps them to rapidly adapt their behaviour and more productively navigate uncertain entrepreneurial opportunities (Paper 3). Thus, Paper 3 adds further nuance to the results by showing that the potential beneficial and harmful effects of impulsivity in entrepreneurship are not inescapable. Trait impulsivity engenders an impulse-driven approach to entrepreneurial learning which can be particularly suited to the adaptability and navigational requirements of the uncertain entrepreneurial domain (Townsend *et al.,* 2018:659).

5.1.2 Implications for practice

Practically, this TBP contributes useful insights to entrepreneurship practice, policy, and pedagogy. First, important implications for entrepreneurial institutions and policy are offered.

Entrepreneurship policy is primarily concerned with enhancing market-level entrepreneurial activity as a mechanism for disrupting markets, enhancing competition, and driving innovation, economic growth and job creation (Su, Zhai & Karlsson, 2017:506). Since the results in Article 1 and Papers 2 and 3 suggest that a lack of reasoning exerts important effects on the entrepreneurial process (entrepreneurial entry, commercial prospects of entry, and entrepreneurial learning), this TBP suggests that impulsivity, at the microfoundational- or individual-level (Bingham *et al.,* 2019:122), is an important market-enhancing mechanism that applies to policymakers and warrants consideration. Although policy and institutional initiatives generally focus on supporting new ventures at later stages of development along deliberate, predicted, and rationalised trajectories; the more nebulous and impulsive nascent stages represent a fruitful and largely unaddressed avenue for enhancing the entrepreneurial ecosystem (Nair *et al.*, 2020:4). By investigating the impulsivity-entrepreneurship relationship and extending understanding of the mechanisms by which impulsivity affects entrepreneurial behaviour, idea quality and learning, this TBP offers fruitful avenues to encourage nascent-stage entrepreneurship through policy targeted at the microfoundational level.

To illustrate, the mechanisms articulated in Article 1 and Papers 2 and 3 can augment more rational later-stage support interventions, such as business plan development, with nascent-stage interventions that accommodate less reasoned precursors of venture emergence (Nair *et al.*, 2020:37). Rather than reducing venture emergence to a linear and rational process (McMullen & Shepherd, 2006:132), **Article 1** demonstrates how an unreasoned focus on opportunity desirability, as opposed to feasibility, is an important catalyst for venture emergence, which can be leveraged. By demonstrating the merit of a less reasoned approach involving a lack of regard for uncertainty and challenges of feasibility, Article 1 provides an alternative prescriptive lever for policy interventions to facilitate entrepreneurial action despite uncertainty. Similarly, rather than reducing the process of recognising and pursuing high-quality venture ideas to rational analysis (Dimov, 2011:58; Lerner *et al.*, 2018c:52), **Paper 2** demonstrates how this process requires one to harness both rational and visceral faculties; to blend unemotional analysis with less deliberative, intuitive processes. By demonstrating how individuals may benefit from interventions that cultivate reliance on hedonic impulses in pursuing a venture idea, Paper 2 offers a reasonable alternative to the incumbent rational-analytic logic prescribed for pursuing high-quality

venture ideas. Last, rather than reducing entrepreneurial learning to a highly deliberative and reflective process that is guided by some ultimate entrepreneurial goal (Lerner *et al.*, 2018c:53), **Paper 3** demonstrates impulse-driven emotion as an important mechanism explaining entrepreneurial learning. By demonstrating the merit of unreasoned emotions, Paper 3 suggests alternative prescriptions to overcome the challenges of solely anchoring learning in reflective (i.e., rational) processes, which may have limitations in uncertain entrepreneurial contexts (Wiklund, Patzelt & Dimov, 2016:18). Overall, by illustrating the relevance of impulsivity in stimulating venture emergence, this TBP makes an empirical case for a recent conceptual argument (Lerner *et al.*, 2018c:53; Nair *et al.*, 2020:37): Entrepreneurship support interventions ought to be augmented to include less reasoned mechanisms rather reducing these interventions to formal, purely rational processes that may largely lead to hesitancy, indecisiveness, and entrepreneurial inaction in the face of uncertainty (Shane & Venkataraman, 2000:217).

Second, by extending understanding of the impulsivity-entrepreneurship link, this TBP may help to understand how impulsive individuals can be assisted to pursue entrepreneurial careers and assist traditional organisations in making workplaces more suited to these individuals. In particular, Article 1 and Papers 2 and 3 show that the entrepreneurial context appears to be a unique domain where impulsive individuals could be better suited to succeed (Markman & Baron, 2003:285; Wiklund *et al.*, 2016:16). This is an important contribution given that the trait is highly prevalent and impactful (Antshel, 2018:265; Lerner, Hunt & Verheul, 2018d:267).

In terms of prevalence, research on ADHD–a pathology partly indicated by trait impulsivity (Antshel, 2018:253)–shows that 4.4% of the adult population in the United States (Kessler, Lane, Stang & Van Brunt, 2009:137), and 5% in South Africa (Schoeman & Liebenberg, 2017:1), are clinically diagnosed with the disorder. Beyond the population of adults with clinically diagnosed ADHD, undiagnosed indications of core symptoms of impulsivity and ADHD are common, with many individuals being impulsive but not perhaps at the pathological/clinical disorder level (Wiklund *et al.*, 2017:627). In fact, most adults display at least one symptom to varying degrees (Lerner, Hunt & Verheul, 2018a:266; Verheul, Block, Burmeister-Lamp, Thurik, Tiemeier & Turturea, 2015:85; Verheul, Rietdijk, Block, Franken, Larsson & Thurik, 2016:793), with evidence that these symptoms are overrepresented

among entrepreneurs (29% of entrepreneurs report being diagnosed with ADHD) relative to the general public (5% report being diagnosed with ADHD; Freeman, Staudenmaier, Zisser & Andresen, 2019:323).

In terms of impactfulness, previous work has generally associated impulsivity with maladaptive behaviour (Ainslie, 1975:463), including reckless driving and motor vehicle accidents (Cheng & Lee, 2012:535; Teese & Bradley, 2008:105), compulsive exercise (Carlson, 2008:1), substance abuse (Adams, Kaiser, Lynam, Charnigo & Milich, 2012:848; Kreek, Nielsen, Butelman & LaForge, 2005:1450), criminality (Ellis, Cooper & Walsh, 2008), gambling (Alessi & Petry, 2003:345; Berg, Latzman, Bliwise & Lilienfeld, 2015:1129), the incursion of higher levels of unsecured debt (Ottaviani & Vandone, 2011:754), poor work performance (Moeller, Barratt, Dougherty, Schmitz & Swann, 2001:1783), and poor academic performance (Colom, Escorial, Shih & Privado, 2007:1503). Research has projected costs of $14,000 (USD) for lost work performance in traditional work contexts among those with ADHD, which is comparable to societal costs for depression and stroke (Kessler, Lane, Stang, & Van Brunt, 2009:137). Thus, impulsivity has widespread and important effects on the economy, healthcare systems, education and the workplace, which indicates its importance as a subject for scholarly work (Antshel, 2018:243). This TBP offers important evidence to ameliorate these prevalent and impactful effects.

Finally, beyond having implications for the advancement of market-level entrepreneurial activity and implications for the career choices of individuals with high levels of impulsivity, it is important to conduct research that offers some prescriptive guidelines on how to improve the conditions or elements of the phenomena under investigation (Wiklund, Wright & Zahra, 2019:6). By extending understanding of the specific moderating, and moderated-mediating mechanisms explaining the effects of impulsivity on entrepreneurial behaviour, idea quality and learning, this TBP can assist practitioners in formulating more targeted and effective support interventions for more impulsive individuals in the entrepreneurial context.

For example, Article 1 suggests that impulsive individuals following an unreasoned pathway to entrepreneurial behaviour would be well suited to pursuing entrepreneurial contexts characterised by high uncertainty. Since possible consequences are unknowable under uncertainty (Townsend *et al.,* 2018:659), a more reasoned, information-gathering approach

is likely of limited value anyway, and a willingness to act quickly without foreknowledge is likely rewarded (Wiklund et al., 2018b:379). Thus, Article 1 indicates that impulsive individuals may be well advised to engage in more uncertain entrepreneurial contexts which offer greater potential for capturing entrepreneurial rents (Westgren & Wuebker, 2019:17), while limiting the usefulness of rational analysis (Arend, 2020:703). Paper 2 suggests that the benefits of impulsivity for idea quality are derived from hedonic impulses rather than disinhibition and that such benefits are constrained by one's level of entrepreneurial experience. Thus, less experienced individuals should practice more caution when drawing on their hedonic impulses in pursuit of a venture idea and perhaps draw more from rational analyses and the vast literature detailing rational analytic tools for venture creation (Hodgkinson & Healey, 2011:1501). Paper 3 indicates that the benefits of impulse-driven emotion for entrepreneurial learning depend, in part, on whether an individual also forecasts future positive emotion. By forming a more coherent representation of a desired future state in an individual's mind, enabling planning, reflection, and the generation of knowledge that has potential future emotional relevance (Anderson, Covin & Slevin, 2009:228), future emotional forecasts can be used as a tool to potentially ameliorate the entrepreneurial learning of more impulsive individuals (particularly those high on urgency or low in deliberation and persistence). Therefore, throughout this TBP, consideration is given to moderating and mediating factors that are more readily adapted, enabling the provision of various 'tools' that can augment the impact of impulsivity in entrepreneurial and organisational contexts.

5.2 LIMITATIONS AND OPPORTUNITIES FOR FUTURE RESEARCH

Although each paper offers valuable and robust insights, each has noted distinct limitations and opportunities for future research. Without reiterating these distinct limitations, some collective limitations and future research opportunities should be noted. While this TBP contributes importantly towards advancing understanding of the role of impulsivity and a lack of reasoning in entrepreneurship, only three outcomes deemed essential to the entrepreneurial process were investigated: entrepreneurial behaviour, idea quality, and entrepreneurial learning. Entrepreneurship as a research domain is characterised by its diversity of phenomena investigated (Shepherd, Wennberg, Suddaby & Wiklund, 2019:165), and there remains a multiplicity of other venturing outcomes that require investigation to arrive at a more integrated theoretical understanding of the effects of impulsivity in

entrepreneurship (Lerner *et al.*, 2018d:268; Wiklund, Hatak, Patzelt & Shepherd, 2018a:182-206; Wiklund *et al.*, 2018b:1-49). For example, as much as entrepreneurial action decisions are an important element of the entrepreneurial process, so too is entrepreneurial inaction decisions (Wood *et al.*, 2017:108). Although counterintuitive, inaction can similarly be impulsive (Carver & Johnson, 2018:1070), and this appears to be a useful line of inquiry which could expand on this TBP, specifically Article 1. One could even begin to conceptualise a broadening of the entrepreneurial behaviour expectations construct of Article 1 to also consider entrepreneurial inaction expectations.

Relatedly, testing the veracity of theory or phenomena (such as unreasoned entrepreneurial pathways) requires the generation of sufficient cumulative evidence to support (or refute) it (Anderson, Wennberg & McMullen, 2019:5; Saad, 2017:466). While this TBP engaged in several robustness tests and conceptual replications (Anderson *et al.*, 2019:5), the interesting results found must be tempered by the understanding that achieving the evidentiary threshold necessary for near-irrefutable evidence of a theory is a significant undertaking that probably requires several replications spanning across different samples, cultures, time-periods, and methodological approaches (Saad, 2017:466). Thus, while this TBP takes a notable initial step in advancing the entrepreneurship literature from a reasoning perspective, future replication and expansion opportunities on this topic abound. In particular, the growing body of neuroeconomic research methods (Sanfey *et al.*, 2006:108) should provide robust means for extending understanding of the most basic neurological, sensory-level cognitive processes underlying impulsivity within the entrepreneurial endeavour (Townsend *et al.*, 2021:19).

5.3 CONCLUSION

The assumption of the entrepreneur as a prescient progenitor, as someone who rationalises and navigates a linear entrepreneurial path to a predetermined venture outcome, is rife in both scholarly works and the popular media (Dimov, 2011:58-65). Yet, as noted in the popular practitioner-centred start-up book by Ries (2011:p. 2):

"*There is a myth-making industry hard at work to sell us that story, but I have come to believe that the story is false, the product of selection bias and after-the-fact rationalization*."

This message underscores an emerging profundity in scholarly understanding of entrepreneurship (Nair *et al.*, 2020:20; Van Lent *et al.*, 2021:1; Wiklund, 2019:4); an awareness that scholars ought to go beyond rationality assumptions and investigate less reasoned drivers of the entrepreneurial process (Lerner *et al.*, 2018c:52). As highlighted by Hunt and Lerner (2018:p. 3), to neglect this impulsive side of the reasoning spectrum is to risk "…forcing entrepreneurship research into an unwanted cul-de-sac of self-limiting relevance." This TBP investigates an unreasoned perspective in entrepreneurship by theorising and testing mechanisms that explain *how* impulsivity affects three important entrepreneurial outcomes: behaviour, the quality of idea pursued, and learning. To complement recent work on unreasoned precursors to entrepreneurship (e.g., Gunia, Gish & Mensmann, 2021:175; Harms, Hatak & Chang, 2019:1; Hatak, Chang, Harms & Wiklund, 2020:1; Lerner, Alkærsig, Fitza, Lomberg & Johnson, 2021:1; Lerner, Hatak & Rauch, 2018b:107; Lerner *et al.*, 2018c:52; Tucker, Zuo, Marino, Lowman & Sleptsov, 2021:5) and to stimulate further investigation in this important domain, this TBP provides an initial foray into the impact of impulsivity and a lack of reasoning in entrepreneurship. While it is not the intent of the author to purge homo-economicus from the repertoire of entrepreneurship theory (the value of rational analysis to entrepreneurship is largely indisputable), this TBP hopes to take an important step towards extending the field to include the unreasoned and more nebulous, thereby extending its relevance to a larger panoply of human decision processes, which occur in reality.

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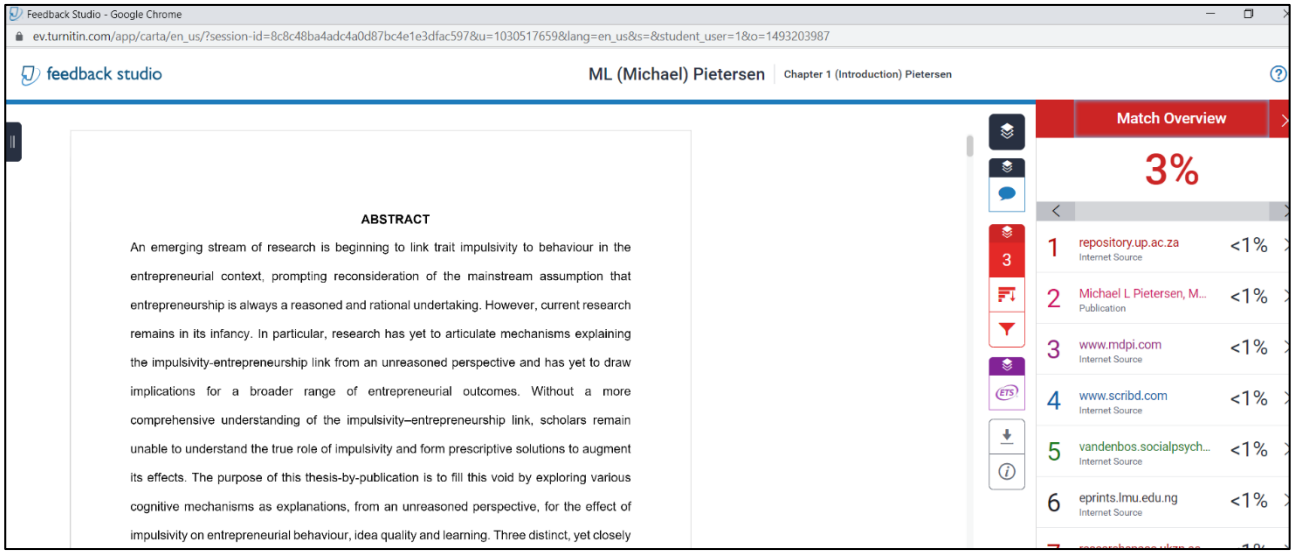
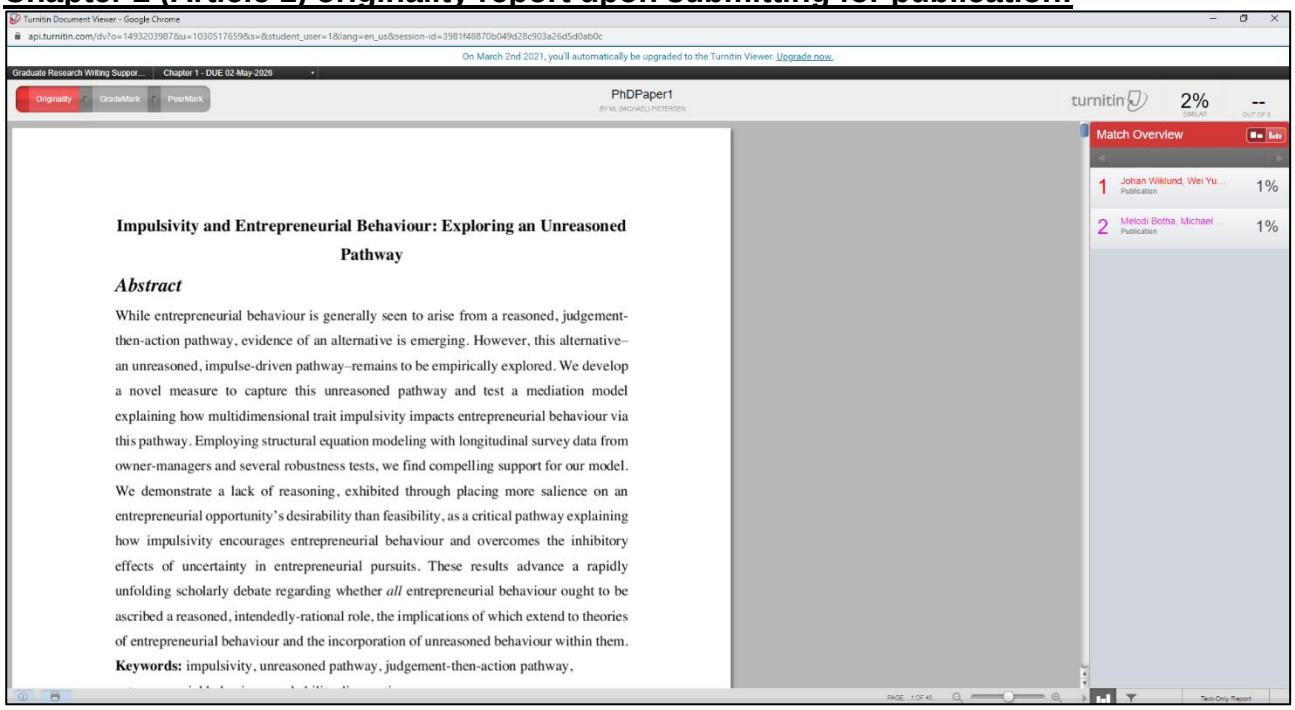
APPENDIX A

- Turnitin Originality Reports -

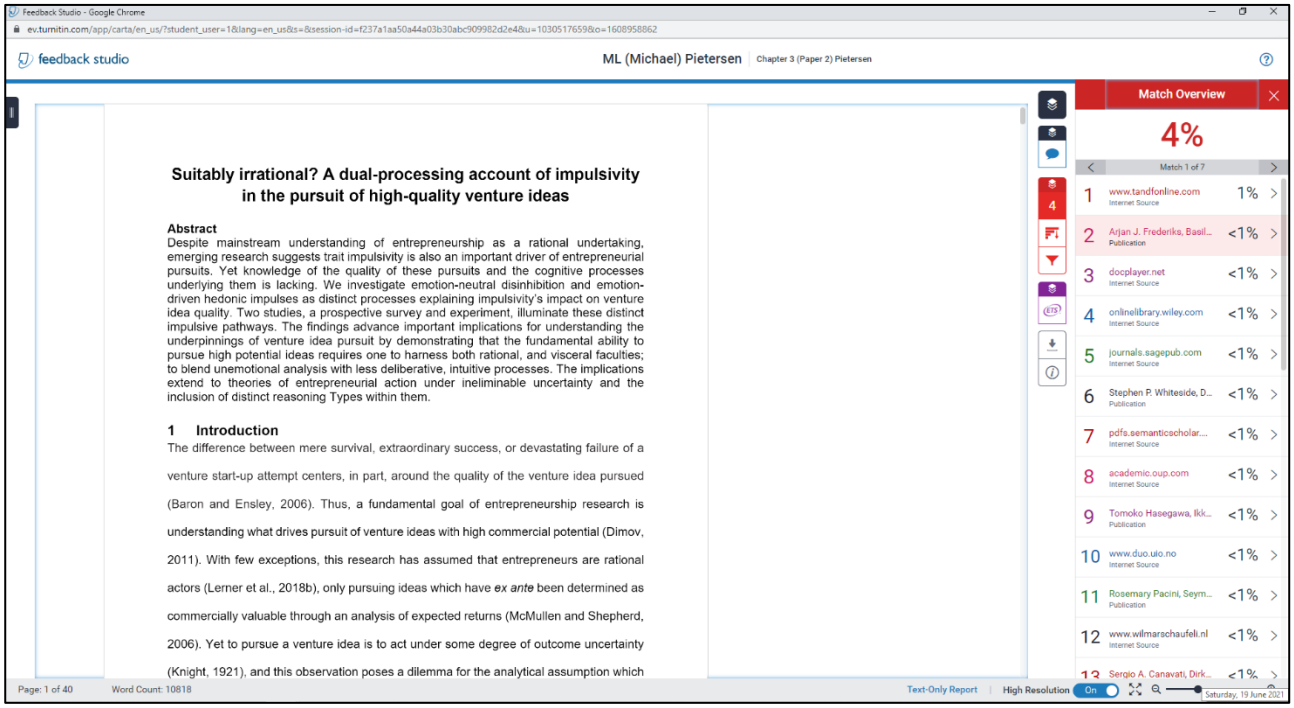
Abstract and Chapter 1 originality report as at 19-06-2021:



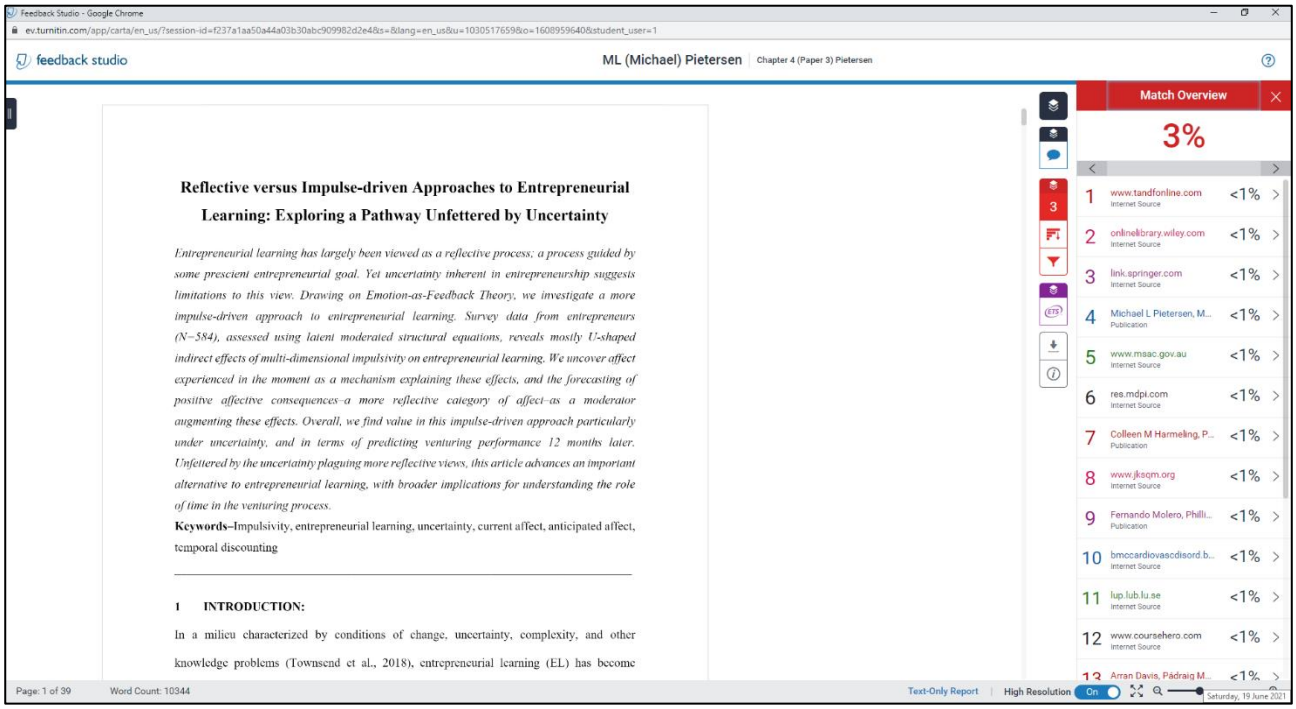
Chapter 2 (Article 1) originality report upon submitting for publication:



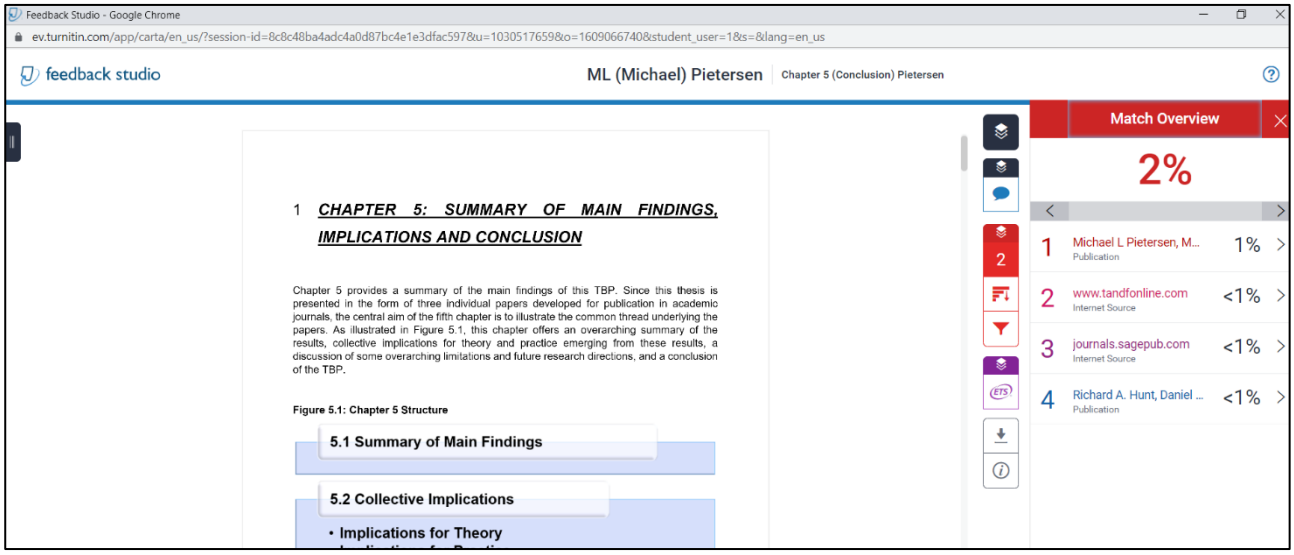
Chapter 3 (Paper 2) originality report as at 19-06-2021:



Chapter 4 (Paper 3) originality report as at 19-06-2021:



Chapter 5 originality report as at 19-06-2021:



APPENDIX B

- Ethics Approval Certificates -

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

RESEARCH ETHICS COMMITTEE

Faculty of Economic and Management Sciences

Approval Certificate

14 February 2020

Mr ML Pietersen
Departement: Business Management

Dear Mr ML Pietersen

The application for ethical clearance for the research project described below served before this committee on:

Protocol No:	EMS017/20
Principal researcher:	Mr ML Pietersen
Research title:	EXPLORING IMPULSIVITY WITHIN THE ENTREPRENEURIAL CONTEXT
Student/Staff No:	14372976
Degree:	Doctoral
Supervisor/Promoter:	Prof M Botha
Department:	Business Management

The decision by the committee is reflected below:

Decision:	Approved
Conditions (if applicable):	
Period of approval:	2020-03-06 - 2020-11-01

The approval is subject to the researcher abiding by the principles and parameters set out in the application and research proposal in the actual execution of the research. The approval does not imply that the researcher is relieved of any accountability in terms of the Codes of Research Ethics of the University of Pretoria if action is taken beyond the approved proposal. If during the course of the research it becomes apparent that the nature and/or extent of the research deviates significantly from the original proposal, a new application for ethics clearance must be submitted for review.

We wish you success with the project.

Sincerely

pp PROF JA NEL
CHAIR: COMMITTEE FOR RESEARCH ETHICS

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

RESEARCH ETHICS COMMITTEE

Faculty of Economic and Management Sciences

Approval Certificate

20 September 2020

Mr ML Pietersen
Department: Business Management

Dear Mr ML Pietersen

The application for ethical clearance for the research project described below served before this committee on:

Protocol No:	EMS164/20
Principal researcher:	Mr ML Pietersen
Research title:	Impulsivity and venture concept quality: a dual-systems account of unreasoned entrepreneurial pursuits
Student/Staff No:	14372976
Degree:	Doctoral
Supervisor/Promoter:	Prof M Botha
Department:	Business Management

The decision by the committee is reflected below:

Decision:	Approved
Conditions (if applicable):	
Period of approval:	2020-10-09 - 2021-12-30

The approval is subject to the researcher abiding by the principles and parameters set out in the application and research proposal in the actual execution of the research. The approval does not imply that the researcher is relieved of any accountability in terms of the Codes of Research Ethics of the University of Pretoria if action is taken beyond the approved proposal. If during the course of the research it becomes apparent that the nature and/or extent of the research deviates significantly from the original proposal, a new application for ethics clearance must be submitted for review.

We wish you success with the project.

Sincerely

pp PROF JA NEL
CHAIR: COMMITTEE FOR RESEARCH ETHICS

APPENDIX C

- Informed Consent Form and Final Questionnaire (Wave 1)-

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Consent for participation in an academic research study
Department of Business Management
Wave 1 questionnaire

Exploring impulsivity within the entrepreneurial context

Research conducted by:

Mr. M.L. Pietersen (14372976)

Cell: 071 545 2914

Email: michael.pietersen@up.ac.za

You are invited to participate in the first round of an academic research study. The study is conducted by Michael Pietersen as a PhD student under the supervision of Prof Melodi Botha in the Department of Business Management at the University of Pretoria.

The purpose of the study is to determine how the trait of being impulsive may relate to the actions taken by entrepreneurs.

Please note the following:

- This study involves an anonymous survey. Your name and that of your company will not appear on the questionnaire and the answers you give will be treated as strictly confidential. You cannot be identified in person based on the answers you give.
- Your participation in this study is very important to us. You may, however, choose not to participate and you may also stop participating at any time without any negative consequences.
- Please answer the questions that follow in the questionnaire as completely and honestly as possible. This should not take more than 10 minutes of your time.
- The results of the study will be used for academic purposes as part of a PhD thesis and may be published in academic journals. These results can be provided to you on request.
- Please contact me, or my study supervisor, Prof Melodi Botha (melodi.botha@up.ac.za) if you have any questions or comments regarding the study.

Please click yes to indicate that:

- You have read and understood the information provided above.
- You give your consent to participate in the study on a voluntary basis.

YES/NO Date

☐ ☐

_____

Resp. no. | | | |

- Exploring impulsivity within the entrepreneurial context -

Dear respondent

Please note, this survey should only be completed by entrepreneurs who currently own and actively run/operate a business.

Thank you for your willingness to complete this survey.

Please answer <u>all</u> the questions by placing a cross (×) in the appropriate block. There are no right or wrong answers. We are interested in understanding your actions as an entrepreneur and factors that may be related to those actions.

<u>Impulsiveness</u>

<u>Impulsiveness definition:</u>

A tendency to react rapidly in situations.

Q1. Several statements describing you appear below. Please read each statement carefully and then indicate the extent to which you agree or disagree that the statement <u>generally describes you</u> in your day-to-day life. The statements continue on the next page.

		Strongly disagree	Disagree	Agree	Strongly agree
1.1	I have a reserved and cautious attitude toward life.	1	2	3	4
1.2	My thinking is usually careful and purposeful.	1	2	3	4
1.3	I am not one of those people who blurt out things without thinking.	1	2	3	4
1.4	I like to stop and think things over before I do them.	1	2	3	4
1.5	I don't like to start a project until I know exactly how to proceed.	1	2	3	4

		Strongly disagree	Disagree	Agree	Strongly agree
1.6	I tend to value and follow a rational, “sensible” approach to things.	1	2	3	4
1.7	I usually make up my mind through careful reasoning.	1	2	3	4
1.8	I am a cautious person.	1	2	3	4
1.9	Before I get into a new situation I like to find out what to expect from it.	1	2	3	4
1.10	I usually think carefully before doing anything.	1	2	3	4
1.11	Before making up my mind, I consider all the advantages and disadvantages.	1	2	3	4
1.12	I have trouble controlling my impulses.	1	2	3	4
1.13	I have trouble resisting my cravings (for food, cigarettes, etc.).	1	2	3	4
1.14	I often get involved in things I later wish I could get out of.	1	2	3	4
1.15	When I feel bad, I will often do things I later regret in order to make myself feel better now.	1	2	3	4
1.16	Sometimes when I feel bad, I can't seem to stop what I am doing even though it is making me feel worse.	1	2	3	4
1.17	When I am upset I often act without thinking.	1	2	3	4
1.18	When I feel rejected, I will often say things that I later regret.	1	2	3	4
1.19	It is hard for me to resist acting on my feelings.	1	2	3	4
1.20	I often make matters worse because I act without thinking when I am upset.	1	2	3	4
1.21	In the heat of an argument, I will often say things that I later regret.	1	2	3	4
1.22	I am always able to keep my feelings under control. (R)	1	2	3	4

		Strongly disagree	Disagree	Agree	Strongly agree
1.23	Sometimes I do things on impulse that I later regret	1	2	3	4
1.24	I generally seek new and exciting experiences and sensations.	1	2	3	4
1.25	I'll try most things once.	1	2	3	4
1.26	I like sports and games in which you have to choose your next move very quickly.	1	2	3	4
1.27	I would enjoy water skiing.	1	2	3	4
1.28	I quite enjoy taking risks.	1	2	3	4
1.29	I would enjoy skydiving.	1	2	3	4
1.30	I welcome new and exciting experiences and sensations, even if they are a little frightening and unconventional.	1	2	3	4
1.31	I would like to learn to fly an airplane.	1	2	3	4
1.32	I sometimes like doing things that are a bit frightening.	1	2	3	4
1.33	I would enjoy the sensation of skiing very fast down a high mountain slope.	1	2	3	4
1.34	I would like to go scuba diving.	1	2	3	4
1.35	I would enjoy fast driving.	1	2	3	4
1.36	I generally like to see things through to the end.	1	2	3	4
1.37	I tend to give up easily. (R)	1	2	3	4
1.38	Unfinished tasks really bother me.	1	2	3	4
1.39	Once I get going on something I hate to stop.	1	2	3	4
1.40	I concentrate easily.	1	2	3	4
1.41	I finish what I start.	1	2	3	4
1.42	I'm pretty good about pacing myself so as to get things done on time.	1	2	3	4

		Strongly disagree	Disagree	Agree	Strongly agree
1.43	I am a productive person who always gets the job done.	1	2	3	4
1.44	Once I start a project, I almost always finish it.	1	2	3	4
1.45	There are so many little jobs that need to be done that I sometimes just ignore them all. (R)	1	2	3	4

Entrepreneurial action

Opportunity definition:

A situation in which new products, services, raw materials, or business processes can be introduced and sold for a profit.

Q2. This scale consists of several words that describe different feelings and emotions. Please read each item and indicate to what extent you feel this way in the moment you recognise a new business opportunity. Use a scale of 1 to 5. One (1) indicates that you feel that emotion **very slightly or not at all** and five (5) indicates that you feel that emotion **extremely strongly**. You may also choose any appropriate number in-between.

		Not at all	A little	Moderately	Quite a bit	Extremely
2.1	Interested	1	2	3	4	5
2.2	Active	1	2	3	4	5
2.3	Excited	1	2	3	4	5
2.4	Attentive	1	2	3	4	5
2.5	Powerful	1	2	3	4	5
2.6	Determined	1	2	3	4	5
2.7	Inspired	1	2	3	4	5
2.8	Alert	1	2	3	4	5
2.9	Enthusiastic	1	2	3	4	5
2.10	Proud	1	2	3	4	5
2.11	Irritable	1	2	3	4	5

		Not at all	A little	Moderately	Quite a bit	Extremely
2.12	Hostile	1	2	3	4	5
2.13	Embarrassed	1	2	3	4	5
2.14	Scared	1	2	3	4	5
2.15	Nervous	1	2	3	4	5
2.16	Regretful	1	2	3	4	5
2.17	Upset	1	2	3	4	5
2.18	Jittery	1	2	3	4	5
2.19	Distressed	1	2	3	4	5
2.20	Afraid	1	2	3	4	5

Q3. Considering that, as an entrepreneur, you must evaluate opportunities throughout your business on a continuous basis. How would you feel if you actually started full-scale operations on a product or service arising from a new opportunity you have recognised? Please choose the position on the scale that, in your view, best describes how you would feel.

Would you enjoy doing it?

3.1	I'd greatly enjoy doing it	1	2	3	4	5	6	7	I'd hate doing it

How tense would you be?

3.2	Very tense	1	2	3	4	5	6	7	Not tense at all

How enthusiastic would you be?

3.3	Very enthused	1	2	3	4	5	6	7	Very unenthusiastic

Q4. Listed below are pairs of descriptive words that one could use to describe a business opportunity. For each pair of descriptive words, choose the position on the scale that, in your view, best describes which characteristics represent a more positive business opportunity.

4.1	Low profit potential in a very uncompetitive market	1	2	3	4	5	6	7	8	9	10	11	High profit potential in a very competitive market

4.2	Product is less attractive to customers, and your personal investment is low	1	2	3	4	5	6	7	8	9	10	11	Product is very attractive to customers, and your personal investment is high

Q5. Choose the position on the scale that, in your view, best describes which opportunity characteristics represent a more promising business opportunity.

5.1	Low profit potential in a very uncompetitive market	1	2	3	4	5	6	7	8	9	10	11	High profit potential in a very competitive market
5.2	Product is less attractive to customers, and your personal investment is low	1	2	3	4	5	6	7	8	9	10	11	Product is very attractive to customers, and your personal investment is high

Q6. Choose the position on the scale that, in your view, best describes which opportunity characteristics represent a more realistic alternative to wage employment.

6.1	Low profit potential in a very uncompetitive market	1	2	3	4	5	6	7	8	9	10	11	High profit potential in a very competitive market
6.2	Product is less attractive to customers, and your personal investment is low	1	2	3	4	5	6	7	8	9	10	11	Product is very attractive to customers, and your personal investment is high

Q7. Please rate the likelihood that in the next 12 months you will start full-scale operations on a product or service arising from a new opportunity you have recognised. Where full-scale operations is the scale needed to produce and sell your products and/or services to customers. These operations may be within your existing business or may be created in a separate business.

	Very unlikely	Unlikely	Slightly unlikely	Neutral	Slightly likely	Likely	Very likely
7	1	2	3	4	5	6	7

Q8. Please rate the likelihood that you will continue running your venture over the next 18 months despite difficulties and alternative opportunities.

8	Very likely to leave the venture	1	2	3	4	5	6	7	8	9	10	11	Very likely to continue the venture

Q9. A number of statements describing your learning throughout running your business appear below. Please read each statement carefully and then indicate the extent to which you agree or disagree that the statement describes your learning about your business.

		Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
9.1	I am good at identifying strategies that haven't worked in my business.	1	2	3	4	5	6	7
9.2	I am good at pinpointing why failed strategies haven't worked in my business.	1	2	3	4	5	6	7
9.3	I am good at learning from strategic/ competitive mistakes in my business.	1	2	3	4	5	6	7
9.4	I regularly modify my choice of business practices and competitive tactics as I see what works and what doesn't.	1	2	3	4	5	6	7

		Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
9.5	I am good at changing my business strategy midstream as I get a sense of the likely effectiveness of my actions.	1	2	3	4	5	6	7
9.6	I am good at recognizing alternative approaches to achieving my business's objectives when it becomes clear that the initial approach won't work.	1	2	3	4	5	6	7

Demographic information

The following questions are important to get an understanding of the characteristics of the sample as a whole in this study and will not be used for any other reason. Please note that you are assured full anonymity and confidentiality in your responses to this study.

Q10. Please select the industries/sectors your main business primarily operates in.

Agriculture	1
Mining	2
Electricity, Gas and Water	3
Manufacturing	4
Construction	5
Trade and Accommodation	6
Transport and Storage	7
Telecommunication	8
Financial Services	9
Real Estate Services	10
Business Services	11

Community and Social Services	12
Personal Services	13
Other (please specify)	14

Q11. Please indicate the province you primarily operate your business from.

Gauteng	1
Western Cape	2
Limpopo	3
Mpumalanga	4
Eastern Cape	5
Northern Cape	6
North West	7
Free State	8
Kwazulu Natal	9

Q12. When did you start your primary business? _____ month_____ year

Q13. Please indicate your gender.

Male	1
Female	2

Q14. Please indicate your age: _____ years

Q15. Please indicate the highest level of education you have completed.

Some high school	1
High school graduate	2
Trade/technical/vocational training/diploma	3

Undergraduate degree	4
Post graduate degree	5

Thank you for completing the survey.

We appreciate your assistance.

APPENDIX D

- Informed consent form and final questionnaire (Wave 2)-

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Consent for participation in an academic research study
Department of Business Management
Wave 2 questionnaire

Exploring the decision-making, action and performance of entrepreneurs

Research conducted by:
Mr. M.L. Pietersen (14372976)
Cell: 071 545 2914
Email: michael.pietersen@up.ac.za

You are invited to participate in the second round of an academic research study, of which the first round you have already participated in. The study is conducted by Michael Pietersen as a PhD student under the supervision of Prof Melodi Botha in the Department of Business Management at the University of Pretoria.

The purpose of this questionnaire is to determine how entrepreneurs' decision-making may relate to the activities they perform, as well as the performance of their businesses.

Please note the following:

- This study involves an anonymous survey. Your name and that of your company will not appear on the questionnaire and the answers you give will be treated as strictly confidential. You cannot be identified in person based on the answers you give.
- Your participation in this study is very important to us. You may, however, choose not to participate and you may also stop participating at any time without any negative consequences.
- Please answer the questions that follow in the questionnaire as completely and honestly as possible. This should not take more than 10 minutes of your time.
- The results of the study will be used for academic purposes as part of a PhD thesis and may be published in academic journals. These results can be provided to you on request.
- Please contact me, or my study supervisor, Prof Melodi Botha (melodi.botha@up.ac.za) if you have any questions or comments regarding the study.

Please click yes to indicate that:

- You have read and understood the information provided above.
- You give your consent to participate in the study on a voluntary basis.

YES/NO Date

☐ ☐

_____

Resp. no. | | | |

- Exploring the decision-making, action and performance of entrepreneurs -

Dear respondent

Thank you for your willingness to participate in this second round of my survey.

Please note, unless otherwise specified, please consider each question with respect to your principal business. That is, the business which you consider to be your main business in terms of accounting for the largest percentage of sales, and/or for the majority of your work time.

Please answer <u>all</u> the questions by placing a cross (×) in the appropriate block. There are no right or wrong answers. We are interested in understanding you as an entrepreneur.

Part 1: Your Activities in your Business

Q1. To what extent did you, in the last 12 months, engage in business related activities that can be characterised as follows:

		Very Infrequently	Infrequently	Slightly Infrequently	Neutral	Slightly Frequently	Frequently	Very Frequently
1.1	Activities in which you have to deal with previously unknown situations.	1	2	3	4	5	6	7
1.2	Activities that are so complex that they are difficult to assess at the start.	1	2	3	4	5	6	7

		Very Infrequently	Infrequently	Slightly Infrequently	Neutral	Slightly Frequently	Frequently	Very Frequently
1.3	Activities in which you enter previously unknown territory.	1	2	3	4	5	6	7
1.4	Activities that require a good deal of adaptability on your part.	1	2	3	4	5	6	7
1.5	Activities that require a completely different strategy.	1	2	3	4	5	6	7
1.6	Activities in which you do not acquire the competences required for carrying them out until you actually carry them out.	1	2	3	4	5	6	7
1.7	Activities whose consequences are not yet exactly foreseeable at the time they are carried out.	1	2	3	4	5	6	7
1.8	Activities in which you reach the limits of your knowledge.	1	2	3	4	5	6	7

		Very Infrequently	Infrequently	Slightly Infrequently	Neutral	Slightly Frequently	Frequently	Very Frequently
1.9	Activities that you carry out very routinely.	1	2	3	4	5	6	7
1.10	Activities you carry out in accordance with a familiar pattern.	1	2	3	4	5	6	7
1.11	Activities for which you are well prepared.	1	2	3	4	5	6	7
1.12	Activities whose execution is completely clear.	1	2	3	4	5	6	7
1.13	Frequently recurring activities.	1	2	3	4	5	6	7
1.14	Easily plannable activities.	1	2	3	4	5	6	7
1.15	Activities that can be carried out within a previously defined period.	1	2	3	4	5	6	7
1.16	Activities that refer to a clearly defined problem area.	1	2	3	4	5	6	7

Q2. Please indicate how much action you have taken to exploit a new business opportunity **in the last 12 months**. That is, how much action have you taken towards introducing new products, services, raw materials or business processes for a profit? This action may be within your existing business or may be created through a separate business.

1	2	3	4	5
None at all	Very little	Some	Quite a lot	Very much
↓	↓	↓	↓	↓
Skip to Q4	**Go to Q3**	**Go to Q3**	**Go to Q3**	**Go to Q3**

3.1	In the last 12 months, how much effort have you applied to activities aimed at introducing new products, services, raw materials or business processes for a profit?	None at all	Very little	Some	Quite a lot	Very much
3.2	In the last 12 months, how much money have you invested in activities aimed introducing new products, services, raw materials or business processes for a profit?	None at all	Very little	Some	Quite a lot	Very much
3.3	At what stage of development are the new products, services, raw materials or business processes you are introducing?	No action taken	Some action taken, but I am considering giving the idea up	Quite a bit of work left to do before the idea is fully operational	The idea is getting close to being operational	The idea is up and running
3.4	Please evaluate the extent of progress made with the new products, services, raw materials or business processes in the last 12 months.	No progress	Some progress	A moderate amount of progress	Quite a bit of progress	Extreme amount of progress

Part 2: Your Decision-Making in your Business

Q4. To what extent do the following statements represent your decision-making when pursuing a new business opportunity? Please note that business opportunity may refer to any situation in which new products, services, raw materials, or business processes can be introduced and sold for a profit.

		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
4.1	I don't like to have to do a lot of thinking about the business opportunity	1	2	3	4	5
4.2	I enjoy solving problems about the business opportunity that require hard thinking	1	2	3	4	5
4.3	Thinking is not my idea of an enjoyable activity when pursuing a business opportunity	1	2	3	4	5
4.4	I am not a very analytical thinker when pursuing a business opportunity	1	2	3	4	5
4.5	Reasoning things out carefully is not one of my strong points when pursuing a business opportunity	1	2	3	4	5
4.6	Thinking hard and for a long time about a business opportunity gives me little satisfaction	1	2	3	4	5
4.7	I have no problem thinking things through carefully when pursuing a business opportunity	1	2	3	4	5
4.8	Using logic usually works well for me in figuring out problems when pursuing a business opportunity	1	2	3	4	5
4.9	I usually have clear, explainable reasons for my decisions when pursuing a business opportunity	1	2	3	4	5
4.10	Learning new ways to think about a business opportunity would be very appealing to me	1	2	3	4	5
4.11	I like to rely on my intuitive impressions when pursuing a business opportunity	1	2	3	4	5
4.12	I don't have a very good sense of intuition when pursuing a business opportunity	1	2	3	4	5
4.13	Using my gut feelings usually works well for me in figuring out problems in my business opportunity pursuits	1	2	3	4	5

		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
4.14	I believe in trusting my hunches when pursuing a business opportunity	1	2	3	4	5
4.15	Intuition can be a very useful way to solve problems when pursuing a business opportunity	1	2	3	4	5
4.16	I often go by my instincts when deciding on a course of action for a business opportunity	1	2	3	4	5
4.17	I trust my feelings about people when pursuing a business opportunity	1	2	3	4	5
4.18	When it comes to trusting people with a business opportunity, I can usually rely on my gut feelings	1	2	3	4	5
4.19	If I were to rely on my gut feelings for a business opportunity, I would often make mistakes	1	2	3	4	5
4.20	When pursuing a business opportunity, I don't like situations where I have to rely on intuition	1	2	3	4	5
4.21	When pursuing a business opportunity, I think there are times when one should rely on one's intuition	1	2	3	4	5
4.22	I think it is foolish to make important decisions based on feelings when pursuing a business opportunity	1	2	3	4	5
4.23	I generally don't depend on my feelings to help me make decisions when pursuing a business opportunity	1	2	3	4	5
4.24	When pursuing a business opportunity, I hardly ever go wrong when I listen to my deepest gut feelings to find an answer	1	2	3	4	5

Q5. Please indicate the organizational level at which decision authority is assigned for each task in your principal business.

		You, in your individual capacity as leader/founder/owner of the company	You plus the top management team (e.g., executive director, the deputy director)	Top management excluding you (e.g., chief operations officer)	Top management and middle management jointly	Middle management only	Middle plus lower level management (e.g., functional managers, plant managers, regional managers, division managers)	Lower level management only
5.1	Deciding to develop new products or services	1	2	3	4	5	6	7
5.2	Making major changes in marketing activities	1	2	3	4	5	6	7
5.3	Making significant changes in product and services	1	2	3	4	5	6	7
5.4	Discontinuing a major product or service.	1	2	3	4	5	6	7
5.5	Making major changes in the department's routines	1	2	3	4	5	6	7
5.6	Prioritizing projects within the venture	1	2	3	4	5	6	7
5.7	Allocating work among available workers	1	2	3	4	5	6	7
5.8	Managing equipment and facilities to be used	1	2	3	4	5	6	7

		You, in your individual capacity as leader/founder/owner of the company	You plus the top management team (e.g., executive director, the deputy director)	Top management excluding you (e.g., chief operations officer)	Top management and middle management jointly	Middle management only	Middle plus lower level management (e.g., functional managers, plant managers, regional managers, division managers)	Lower level management only
5.9	Deciding which new projects to pursue in the department	1	2	3	4	5	6	7
5.10	Making quality control decisions	1	2	3	4	5	6	7

Part 3: Characteristics of your Latest Business Opportunity

Q6. In your opinion, are the following items **characteristic of the latest business opportunity you pursued/are pursuing**? Please note that business opportunity refers to any situation in which new products, services, raw materials, or business processes can be introduced and sold for a profit.

		Not at all like it	Unlike it	Slightly unlike it	Neutral	Slightly like it	Like it	Very much like it
6.1	It has a favourable financial model	1	2	3	4	5	6	7
6.2	It can generate high profit margins	1	2	3	4	5	6	7
6.3	It can create quick cash flow	1	2	3	4	5	6	7

		Not at all like it	Unlike it	Slightly unlike it	Neutral	Slightly like it	Like it	Very much like it
6.4	It takes a short amount of time to complete a sale	1	2	3	4	5	6	7
6.5	It has high return and low investment	1	2	3	4	5	6	7
6.6	The business opportunity is unique	1	2	3	4	5	6	7
6.7	There is nothing like it	1	2	3	4	5	6	7
6.8	The product/service is different from others	1	2	3	4	5	6	7
6.9	It involves new technology	1	2	3	4	5	6	7
6.10	It allows unique applications	1	2	3	4	5	6	7
6.11	It has a large market	1	2	3	4	5	6	7
6.12	It is an unmet need or unsolved problem	1	2	3	4	5	6	7
6.13	It is easy to enter the market	1	2	3	4	5	6	7
6.14	There are few competitors	1	2	3	4	5	6	7
6.15	There is a mass market	1	2	3	4	5	6	7

Part 4: Performance of your Business

Q7. Please rate your performance over the PAST 3 YEARS (or for as long as you have owned the business IF owned for less than 3 years) **relative to your main/closest competitors**. Refer to your principal business if you have started more than one.

		Much lower	A little Lower	Equal	A bit higher	Much higher
7.1	Total net profits	1	2	3	4	5
7.2	Product/service quality	1	2	3	4	5
7.3	Cash flow (liquidity)	1	2	3	4	5
7.4	Return-on-investment	1	2	3	4	5
7.5	Return-on-sales	1	2	3	4	5
7.6	Return-on-assets	1	2	3	4	5
7.7	Total Sales growth	1	2	3	4	5
7.8	Revenue growth	1	2	3	4	5
7.8	Asset growth	1	2	3	4	5
7.9	Growth in number of employees	1	2	3	4	5
7.10	Market share growth	1	2	3	4	5
7.11	Customer satisfaction	1	2	3	4	5
7.12	Employee satisfaction	1	2	3	4	5
7.13	Customer recommendations	1	2	3	4	5
7.14	Bank or financial institution satisfaction	1	2	3	4	5
7.15	Shareholder satisfaction	1	2	3	4	5
7.16	Business social contribution (e.g., community assistance programmes)	1	2	3	4	5
7.17	Environmentally friendly business (e.g., recycling)	1	2	3	4	5

		Much lower	A little Lower	Equal	A bit higher	Much higher
7.18	Social recognition (e.g., good business reputation)	1	2	3	4	5

Part 5: Your Entrepreneurial Experience

Q8. Listed below are descriptions of a variety of entrepreneurial activities. Please indicate **your level of experience** with engaging in each activity.

		Very low	A little	Moderate	Quite a bit	Very high
8.1	Starting up a new business on your own	1	2	3	4	5
8.2	Being part of a new business start-up	1	2	3	4	5
8.3	Taking over an existing business	1	2	3	4	5
8.4	Establishing new businesses	1	2	3	4	5
8.5	Developing services, or processes	1	2	3	4	5
8.6	New product development	1	2	3	4	5

Part 6: Your Business Environment

Q9. Please indicate the extent to which you agree or disagree with each statement as it applies to your business' principal industry (i.e., the industry that accounts for the largest percentage of your business's sales).

		Strongly Disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly Agree
9.1	Actions of competitors are generally quite easy to predict.	1	2	3	4	5	6	7
9.2	The set of competitors in my industry has remained relatively constant over the last 3 years.	1	2	3	4	5	6	7
9.3	Product demand is easy to predict.	1	2	3	4	5	6	7
9.4	Customer requirements / preferences are easy to predict.	1	2	3	4	5	6	7
9.5	My industry is very stable with very little change resulting from major economic, technological, social, or political forces.	1	2	3	4	5	6	7
9.6	The failure rate of firms in my industry is high.	1	2	3	4	5	6	7

		Strongly Disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly Agree
9.7	My industry is very risky, such that one bad decision could easily threaten the viability of my business unit.	1	2	3	4	5	6	7
9.8	Competition in my industry is high/intense.	1	2	3	4	5	6	7
9.9	Customer loyalty is low in my industry.	1	2	3	4	5	6	7
9.10	Severe price wars are characteristic of my industry.	1	2	3	4	5	6	7
9.11	Low profit margins are characteristic of my industry.	1	2	3	4	5	6	7

Part 7: Background Information

Q10. How many full-time employees does your firm have? _____

Q11. What percentage of sales are from new products, services, raw materials, or business processes that your principal business did not offer in the previous 12 months? _____%

Q12.	Please indicate the total number of:	Amount
12.1	new products, services, raw materials, or business processes you have ***successfully*** introduced and sold for a profit within the last three years?	

Q12.	Please indicate the total number of:	**Amount**
12.2	new products, services, raw materials, or business processes you have ***attempted but failed*** to introduce and sell for a profit within the last three years?	

Q13. Please indicate whether the following statements about you are true or false.

		False	**True**
13.1	I am always willing to admit it when I make a mistake	0	1
13.2	I always try to practice what I preach	0	1
13.3	I never resent being asked to return a favour	0	1
13.4	I have never been annoyed when people expressed ideas very different from my own	0	1
13.5	I have never deliberately said something that hurt someone's feelings	0	1
13.6	I like to gossip at times	0	1
13.7	There have been occasions when I took advantage of someone	0	1
13.8	I sometimes try to get even, rather than forgive and forget	0	1
13.9	At times I have really insisted on having things my own way	0	1
13.10	There have been occasions when I felt like smashing things	0	1

Thank you for completing the survey.
We appreciate your assistance.

APPENDIX E

- Study 2 Informed Consent Form and Final Experiment -

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Consent for participation in an academic research study

Department of Business Management

Business decision-making and idea generating study

You are invited to participate in an academic research study.

The purpose of the study is to understand how individuals make business decisions and generate ideas. You will be required to provide details about your background and your work experience, as well as complete a number of decision tasks, including a task to develop a business idea.

Please note the following:

- This study involves an anonymous experiment. Your name will not appear on the questionnaire and the answers you give will be treated as strictly confidential. You cannot be identified in person based on the answers you give.
- Your participation in this study is very important to us. You may, however, choose not to participate and you may also stop participating at any time without any negative consequences. Your $2.00 reward will be payable after the study is fully completed.
- Please answer the questions and instructions that follow as completely and honestly as possible. This study should take approximately 40 minutes to complete.
- The results of the study will be used for academic purposes as part of a PhD thesis and may be published in academic journals.
- Please contact me via MTurk if you have any questions or comments regarding the study.

Please click yes to indicate that:

- You have read and understood the information provided above.
- You give your consent to participate in the study on a voluntary basis.

YES/NO Date

☐ ☐

_____

Resp. no. | | | |

- Business decision-making and idea generating study -

Screen 1

Thank you for accepting this human intelligence task (HIT). You will receive $2.00 for participating. In this task, you will participate in a business decision-making and idea generating study, and then answer a short survey at the end. Please complete this study in one sitting. For the duration of this study, please do not open any other browsers or tabs, do not use any other device, and do not talk to anyone else. When you finish the survey, you will receive a completion code in order to get paid.

Please answer all the questions by placing a cross (✘) in the appropriate block or typing your desired response in the open blocks. There are no wrong or right answers, we are interested in understanding how people generate ideas, particularly business ideas to commercialize a newly developed technology.

Q1. Before we begin the idea task, we would like to know the following: How interested are you in engaging in the following activities? (Note that your answer will not affect whether or not you are allowed to participate in the study)

		Very low interest	A little interest	Moderate interest	Quite a bit of interest	Very high interest
1.1	Starting up a new business	1	2	3	4	5
1.2	Acquiring an existing business	1	2	3	4	5
1.3	Starting and building a high-growth business	1	2	3	4	5
1.4	Acquiring and building a company into a high-growth business	1	2	3	4	5

Click 'Next' to begin the study.

Screen 2

INTUITIVE CONDITION

The purpose of this questionnaire is to assess how people are able to focus on their **feelings** in reaction to certain words and ideas, that is, what people feel and how they behave on the basis of their feelings. To this end, please complete the following five questions.

QI2. When you hear the word “technology,” what do you feel? Please use a word or sentence to describe your predominant feelings.

QI3. When you hear the word “marriage,” what do you feel? Please use a word or sentence to describe your predominant feelings.

QI4. When you hear the word “revolution,” what do you feel? Please use a word or sentence to describe your predominant feelings.

QI5. When you hear the word “entrepreneur,” what do you feel? Please use a word or sentence to describe your predominant feelings.

QI6. When you hear the word “ocean,” what do you feel? Please use a word or sentence to describe your predominant feelings.

ANALYTICAL CONDITION

The purpose of this questionnaire is to assess how people are able to use logic and analytical thought, to make decisions and solve problems. To this end, please complete the following five questions.

QA2. If an object travels at five feet per minute, then by your calculations how many feet will it travel in 360 seconds? _____

QA3. If a consumer bought 30 books for US $540, then, by your calculation how much did the consumer pay, on average, for each book?

_____

QA4. To buy a computer, Raquel borrowed US $1,000 at a 10% annual interest rate to be paid in 2 years. How much money will she have to repay in 2 years?

_____

QA5. A train ticket from A to B cost US $5 last year. This year, the price has increased to US $5.50. Compared to last year, what is the percentage increase?

5%	**8%**	**10%**	**20%**	**30%**
1	2	3	4	5

QA6. What is the solution to the system of equations shown below?

$$7x + 3y = -8$$

$$-4x - y = 6$$

(-2, -2)	**(-2, 2)**	**(2, -2)**	**(2, 2)**
1	2	3	4

DISINHIBITION CONDITION

The purpose of this questionnaire is to assess how people react to being disinhibited, that is, how people behave when they do not care about what others think or the rules of how one is expected to behave. To this end, please complete the following three questions:

QD2. Please briefly describe a situation out of your own life in which you acted without inhibitions, without concern for what others may think and without doing a lot of thinking about what may happen.

QD3. Please briefly describe how you behaved in the situation in which you acted without inhibitions, without concern for what others may think and without doing a lot of thinking about what may happen.

QD4. Please briefly describe what you experienced when you acted without inhibitions, without concern for what others may think and without doing a lot of thinking about what may happen.

CONTROL CONDITION

The purpose of this questionnaire is to assess how people experience a normal day in their lives, that is, how people usually behave on a regular day and what they experience. To this end, please complete the following three questions:

QC2. Please briefly describe a situation out of your own life in which you acted in a normal way like you do on a regular day.

QC3. Please briefly describe how you behave when you act in a normal way like you do on a regular day.

QC4. Please briefly describe what you experience when you act in a normal way on a regular day.

Screen 3

TECHNOLOGY ASSESSMENT PROMPT

Please read the following description of a newly developed technology. You will be asked questions this technology.

Top-Tier University has just announced the development of new software that analyzes multiple video recordings to track the movement of multiple people across different locations. The All View Information Software (AVIS) does this through a unique face recognition program developed by a team of graduate students from Top-Tier University's advanced informatics laboratory. “In many ways, our software works like a google search engine for faces,” says Lonny Granston, one of the students from the team. “By using our software on the videos recorded every day by the closed-circuit television cameras installed in most public places, we are able to track the movements of individuals from camera to camera.” The ability to do this is hardly new. Surveillance agencies have used movement-tracking technologies for a while now. “The power of our innovation rests in the analytics we have automated,” says Granston. “We can generate reports on the speed with which people moved from one place to the other, identifying where they have slowed, stopped or sped up. By combining this with detailed maps of the spaces where they were moving, we can then tell what people were looking at, for how long, whether they lingered or returned, and tie all that to where they were before or where they were rushing to afterwards. In short, we can tell a lot about what ‘moves’ people!” Initial tests have shown that the AVIS technology is easy to deploy on the most common video monitoring platforms available, possibly allowing for its adaptation to different purposes.

The AVIS technology has been patented. Estimates of the profit potential for a new business based on the AVIS technology are uncertain because of fluctuations in a number of opportunity related risk factors.

Q7. Please describe a high-quality business idea or opportunity based on the AVIS Technology described. By "business idea or opportunity", we mean "applying the AVIS technology to generate revenues and a profit".

Q8. Assuming that (1) the general economy is relatively stable (not trending up or down at the present time), and (2) you have the resources available to purchase the patent and to initially attempt launching a business around your idea to commercialize the AVIS technology, rate the likelihood that you would…

		Very unlikely	Unlikely	Slightly unlikely	Neutral	Slightly likely	Likely	Very likely
8.1	Purchase the AVIS patent to pursue your idea	1	2	3	4	5	6	7
8.2	Pay a premium for the AVIS patent to pursue your idea	1	2	3	4	5	6	7
8.3	Take action to start a business based on your idea	1	2	3	4	5	6	7
8.4	Invest your time and money in the launch of a new business venture based on your idea	1	2	3	4	5	6	7

Screen 4

To ensure that we fully understand your business idea based on the AVIS Technology described, please answer the following questions:

Q9. What is the product or service? Please explain.

Q10. What problem(s) will it solve? Please explain.

Q11. Who are the target customers? Please explain.

Q12. What value does this deliver to the customer? Please explain.

Q13. How does it solve this/these problem(s)? Please explain.

Q14. Via which channel(s) will this product or service be sold? Please explain.

Q15. How will it generate revenue? Please explain.

Q16. What are the most important costs? Please explain.

Q17. What are the key activities that will be involved in setting up this business? Please explain.

Q18. What are the key resources (e.g., human, financial, intellectual resources) that will be involved in setting up this business? Please explain.

Q19. What is the competitive advantage of the product? That is, what makes your idea better than competitors who offer similar solutions? Please explain.

Please click 'Next' to complete the task and answer the short post-task survey.

Screen 3-time pressure condition

TECHNOLOGY ASSESSMENT PROMPT

Please read the following description of a newly developed technology. You will be asked questions this technology.

Top-Tier University has just announced the development of new software that analyzes multiple video recordings to track the movement of multiple people across different locations. The All View Information Software (AVIS) does this through a unique face recognition program developed by a team of graduate students from Top-Tier University's advanced informatics laboratory. “In many ways, our software works like a google search engine for faces,” says Lonny Granston, one of the students from the team. “By using our software on the videos recorded every day by the closed-circuit television cameras installed in most public places, we are able to track the movements of individuals from camera to camera.” The ability to do this is hardly new. Surveillance agencies have used movement-tracking technologies for a while now. “The power of our innovation rests in the analytics we have automated,” says Granston. “We can generate reports on the speed with which people moved from one place to the other, identifying where they have slowed, stopped or sped up. By combining this with detailed maps of the spaces where they were moving, we can then tell what people were looking at, for how long, whether they lingered or returned, and tie all that to where they were before or where they were rushing to afterwards. In short, we can tell a lot about what ‘moves’ people!” Initial tests have shown that the AVIS technology is easy to deploy on the most common video monitoring platforms available, possibly allowing for its adaptation to different purposes.

The AVIS technology has been patented. Estimates of the profit potential for a new business based on the AVIS technology are uncertain because of fluctuations in a number of opportunity related risk factors.

Q7. Please describe a high-quality business idea or opportunity based on the AVIS Technology described. Please do so as quickly as possible. You have 2 minutes. By "business idea or opportunity", we mean "applying the AVIS technology to generate revenues and a profit".

Q8. Please answer the following as quickly as possible. You have 45 seconds. Assuming that (1) the general economy is relatively stable (not trending up or down at the present time), and (2) you have the resources available to purchase the patent and to initially attempt launching a business around your idea to commercialize the AVIS technology, rate the likelihood that you would…

		Very unlikely	Unlikely	Slightly unlikely	Neutral	Slightly likely	Likely	Very likely
8.1	Purchase the AVIS patent to pursue your idea	1	2	3	4	5	6	7
8.2	Pay a premium for the AVIS patent to pursue your idea	1	2	3	4	5	6	7
8.3	Take action to start a business based on your idea	1	2	3	4	5	6	7
8.4	Invest your time and money in the launch of a new business venture based on your idea	1	2	3	4	5	6	7

Screen 4-time pressure condition

To ensure that we fully understand your business idea based on the AVIS Technology described, please answer the following 10 questions. Please do so as quickly as possible. You have 8 minutes.

Q9. What is the product or service? Please explain.

Q10. What problem(s) will it solve? Please explain.

Q11. Who are the target customers? Please explain.

Q12. What value does this deliver to the customer? Please explain.

Q13. How does it solve this/these problem(s)? Please explain.

Q14. Via which channel(s) will this product or service be sold? Please explain.

Q15. How will it generate revenue? Please explain.

Q16. What are the most important costs? Please explain.

Q17. What are the key activities that will be involved in setting up this business? Please explain.

Q18. What are the key resources (e.g., human, financial, intellectual resources) that will be involved in setting up this business? Please explain.

Q19. What is the competitive advantage of the product? That is, what makes your idea better than competitors who offer similar solutions? Please explain.

Please click 'Next' to complete the task and answer the short post-task survey.

Screen 5

Thank you for participating in this experiment. To complete this HIT, we would now like to get just a few details about you, your work experience and how you would you describe your decision process regarding your business idea. Please note that these questions are only used to get an understanding of the characteristics of the sample as a whole and will not be used for any other reason. You are assured full anonymity and confidentiality in your responses to this study.

Q20.1.1. Please describe in a sentence or two what you think the study was about.

Q20. To what extent do the following statements represent your decision-making regarding the venture idea/opportunity you developed?

		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
20.1	I didn't do a lot of thinking	1	2	3	4	5
20.2	I solved the problem through hard thinking	1	2	3	4	5
20.3	I was not very analytical	1	2	3	4	5
20.4	I did not reason things out very carefully	1	2	3	4	5
20.5	I had no problem thinking the idea through carefully	1	2	3	4	5
20.6	I used logic to figure out problems	1	2	3	4	5
20.7	I had clear, explainable reasons for my decisions regarding the business opportunity	1	2	3	4	5
20.8	I relied on my intuitive impressions	1	2	3	4	5
20.9	I had a very good sense of intuition	1	2	3	4	5
20.10	My gut feelings worked well for me in figuring out problems and business solutions	1	2	3	4	5
20.11	I trusted my hunches	1	2	3	4	5
20.12	Intuition was a very useful way to decide on a business opportunity	1	2	3	4	5
20.13	I went by my instincts when deciding on a course of action for the idea	1	2	3	4	5
20.14	If I were to rely on my gut feelings, I would have made mistakes	1	2	3	4	5
20.15	It would have been foolish to make decisions about the opportunity based on feelings	1	2	3	4	5
20.16	I didn't depend on my feelings to help me make decisions	1	2	3	4	5
20.17	I listened to my deepest gut feelings to find an answer	1	2	3	4	5
20.18	At some point in my life, I have had to consume water in some form	1	2	3	4	5

Q21. How many years of work experience do you have? _____ years.

Q22. In how many different occupational fields of experience have you been active? Accounting, human resource management, marketing, and plumbing would be examples. We are interested not in the number of specific jobs you have had but the number of past and present occupational fields of experience. _____

Q23. In how many different industries have you been active? Insurance, lumbar, farming, pharmaceutical, and telecommunications industries would be examples. _____

Q24. If you are reading this query, please type the word "nonsense" in the blank provided to assure the researchers that you are aware of this query. _____

Q25. Please indicate the number of new business ventures you have founded. _____ ventures.

Q26. Please indicate the number of business ventures you have owned in the Information technology industry. _____ ventures.

Q27.1. Please indicate how much prior knowledge you have about video-tracking software.

No knowledge	1	2	3	4	5	6	7	**Extensive knowledge**

Q27.2. Please indicate how much prior knowledge you have about technologies similar to the AVIS technology.

No knowledge	1	2	3	4	5	6	7	**Extensive knowledge**

Q28. Listed below are descriptions of a variety of entrepreneurial activities. Please indicate **your level of experience** with engaging in each activity.

		No experience	**Very low experience**	**A little experience**	**Moderate experience**	**Quite a bit of experience**	**A lot of experience**	**Extremely experienced**
28.1	Starting up a new business on your own	1	2	3	4	5	6	7
28.2	Being part of a new business start-up	1	2	3	4	5	6	7
28.3	Taking over an existing business	1	2	3	4	5	6	7

		No experience	Very low experience	A little experience	Moderate experience	Quite a bit of experience	A lot of experience	Extremely experienced
28.4	For this query, select "very low" and continue with the remaining questions	1	2	3	4	5	6	7
28.5	Establishing new businesses	1	2	3	4	5	6	7
28.6	Developing new products, services, or processes	1	2	3	4	5	6	7
28.7	Exploiting technological changes and trends in industry	1	2	3	4	5	6	7

Q29. Please select the industries/sectors you have worked in. (*Please tick <u>all</u> the options that apply.*)

Agriculture	1
Mining	2
Electricity, Gas and Water	3
Manufacturing	4
Construction	5
Trade and Accommodation	6
Transport and Storage	7
Telecommunication	8
Information technology	
Financial Services	9
Real Estate Services	10
Business Services	11
Healthcare	
Community and Social Services	12
Personal Services	13
Other (please specify)	14

Q30. In which state do you currently reside.

Full list of US states provided on Qualtrics platform	1

Q31. Please indicate your gender.

Female	1
Male	2
Prefer not to say	3
Prefer to self-describe	4

Q32. Please indicate your age: _____ years

Q33. Please indicate the highest level of education you have completed.

Less than a high school diploma	1
High school or equivalent (e.g., GED)	2
Some college, no degree	3
Trade/technical/vocational training/diploma	4
Associate degree (e.g. AA, AS)	5
Bachelor's degree (e.g. BA, BS)	6
Master's degree (e.g. MA, MS, MEd)	7
Doctorate or professional degree (e.g. MD, DDS, PhD)	8

Q34. Please indicate the academic discipline(s) for which you have tertiary qualifications. We are interested in the specific majors of your education after school. (*Please tick all the options that apply.*)

Arts	
Classics	
Economics	
Education	
Engineering	
Entrepreneurship	
Health sciences	
Humanities	
Information Technology	

Law	
Management studies	
Music	
Natural sciences	
Philosophy	
Political science	
Veterinary science	
Other (please specify)	
None	

Q35. Did you follow all the instructions given to you in this study?

No	
I don't remember	
Yes	

Please click 'Next' to complete the survey and receive your completion code.

Screen 6

Qualtrics code generator: ##

Thank you for completing this HIT.
Please paste your unique code in the space provided on MTurk.
For more details on what this study was about, please click the participant debrief here.

Screen 7: Participant debrief

This experiment is designed to examine the impact of intuition versus logic and analysis on the business ideas individuals are able to generate. Previous work has shown that there may be a link between these information processing modes and the ideas individuals develop and pursue in business. The experiment employs a between-participants design with four conditions. The independent variable is the type of information processing (intuitive,

analytical, or disinhibited). The dependent variables are the idea generated and the likelihood of action on this idea. We primed the independent variable using a direct process priming method and then asked participants to develop business ideas around a new technology. This priming method is completely natural and works by making participants more likely to use intuition or analysis in the subsequent tasks in the few minutes following the prime. The experiment and technology in this study are purely fictional and respondents are encouraged to interpret all the tasks thereof in this light. This study is fully anonymous. You cannot be identified in person based on the answers you give.
Thank you for your time.

Further Reading

Janiszewski C and Wyer Jr RS (2014) Content and process priming: A review. Journal of Consumer Psychology 24(1): 96-118.

Screen 7: Participant debrief-time pressure condition

This experiment is designed to examine the impact of intuition versus logic and analysis on the business ideas individuals are able to generate. Previous work has shown that there may be a link between these information processing modes and the ideas individual develop and pursue in business. The experiment employs a between-participants design with four conditions. The independent variable is the type of information processing (intuitive, analytical, or disinhibited). The dependent variables are the idea generated and the likelihood of action on this idea. We encouraged disinhibition by adding time pressure to the task asking participants to develop business ideas around a new technology. This time pressure is completely natural and works by making participants less likely to think carefully about their choices during the task. The experiment and technology in this study are purely fictional and respondents are encouraged to interpret all the tasks thereof in this light. This study is fully anonymous. You cannot be identified in person based on the answers you give.
Thank you for your time.

Further Reading

Rand DG, Greene JD and Nowak MA (2012) Spontaneous giving and calculated greed. Nature 489(7416): 427-430.

APPENDIX F

- Study 2 Informed Consent Form and Independent Rater Task -

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Consent for participation in an academic research study
Department of Business Management
Independent expert survey

Exploring the quality of ideas as assessed by independent experts

Research conducted by:
Mr. M.L. Pietersen (14372976)
Cell: 071 545 2914
Email: michael.pietersen@up.ac.za

You are invited to participate in an academic research study conducted by Michael Pietersen as a PhD student under the supervision of Prof Melodi Botha in the Department of Business Management at the University of Pretoria.

The purpose of this questionnaire is to collect your assessments of the quality of business venture ideas presented to you.

Please note the following:

- This study involves an anonymous survey. Your name and that of your company will not appear on the questionnaire and the answers you give will be treated as strictly confidential. You cannot be identified in person based on the answers you give.
- Your participation in this study is very important to us. You may, however, choose not to participate and you may also stop participating at any time without any negative consequences.
- Please answer the questions that follow in the questionnaire as completely and honestly as possible. This survey should take approximately 2 working days to complete.
- The results of the study will be used for academic purposes as part of a PhD thesis and may be published in academic journals.
- Please contact me, or my study supervisor, Prof Melodi Botha (melodi.botha@up.ac.za) if you have any questions or comments regarding the study.

Please sign the form to indicate that:

- You have read and understood the information provided above.
- You give your consent to participate in the study on a voluntary basis.

_____ _____

Respondent's signature Date

Resp. no. | | | |

- Exploring the quality of ideas as assessed by independent experts -

The purpose of this study is to assess the quality of business ideas based on a newly developed technology. Please read the following description of this new technology and then assess the ideas presented to you based on this technology.

AVIS Technology:

Top-Tier University has just announced the development of new software that analyzes multiple video recordings to track the movement of multiple people across different locations. The All View Information Software (AVIS) does this through a unique face recognition algorithm developed by a team of graduate students from Top-Tier University's advanced informatics laboratory. “In many ways, our software works like a google search engine for faces,” says Lonny Granston, one of the students from the team. “By using our software on the videos recorded every day by the closed-circuit television cameras installed in most public places, we are able to track the movements of individuals from camera to camera.” The ability to do this is hardly new. Surveillance agencies have used movement-tracking technologies for a while now. “The power of our innovation rests in the analytics we have automated,” says Granston. “We can generate reports on the speed with which people moved from one place to the other, identifying where they have slowed, stopped or sped up. By combining this with detailed maps of the spaces where they were moving, we can then tell what people were looking at, for how long, whether they lingered or returned, and tie all that to where they were before or where they were rushing to afterwards. In short, we can tell a lot about what ‘moves’ people!” Initial tests have shown that the AVIS technology is easy to deploy on the most common video monitoring platforms available, possibly allowing for its adaptation to different purposes.

The AVIS technology has been patented. Estimates of the profit potential for a new business based on the AVIS technology are uncertain because of fluctuations in a number of opportunity related risk factors.

Please read the following description about business idea #_____ based on the AVIS Technology:

****IDEA PROVIDED BY PARTICIPANTS INSERTED HERE (refer to Q7 and Q9–Q19 of experiment)****

The following statements are about THE BUSINESS IDEA you have just read. By "business idea", we mean "applying the AVIS technology to develop and sell a product/service to particular users/clients".

With these questions, I want to poll **your honest views about THE BUSINESS IDEA you are currently reading**, in and of itself, SEPARATE from what you think of your entrepreneurial skills, those of your team or your overall suitability for pursuing this particular venture. Please also assume that the general economy is relatively stable (not trending up or down at the present time).

To do this, it helps if you "push aside" the above assessment of your abilities and position to pursue the idea. Focus on THE IDEA ITSELF. Try to distance yourself from it, **looking at it as an objective outsider would**. That is, we want you to imagine and assess the idea, knowing everything you already know about this idea, the AVIS technology on which it is based, and its potential value and feasibility; but as someone who is not involved yourself in working on it.

Q1. Please indicate the idea number (#) you are currently assessing: _____

Q2. With this idea in mind, and *considering each question carefully and separately*, please indicate **how confident** you are that...

		Not at all confident						Extremely confident
2.1	This venture idea has a favourable financial model	1	2	3	4	5	6	7
2.2	This venture idea can generate high profit margins	1	2	3	4	5	6	7
2.3	This venture idea can create quick cash flow	1	2	3	4	5	6	7
2.4	This venture idea takes a short amount of time to complete a first sale	1	2	3	4	5	6	7
2.5	This venture idea has high return and low investment	1	2	3	4	5	6	7
2.6	This venture idea is unique	1	2	3	4	5	6	7
2.7	There is nothing like this venture idea	1	2	3	4	5	6	7
2.8	This product/service is different from others	1	2	3	4	5	6	7
2.9	This venture idea involves novel solutions	1	2	3	4	5	6	7
2.10	This venture idea allows unique applications	1	2	3	4	5	6	7
2.11	This venture idea has a large market	1	2	3	4	5	6	7
2.12	This venture idea has an unmet need or unsolved problem	1	2	3	4	5	6	7
2.13	This venture idea offers an easy entry into the market	1	2	3	4	5	6	7
2.14	This venture idea has few competitors	1	2	3	4	5	6	7

		Not at all confident						Extremely confident
2.15	This venture idea has a mass market	1	2	3	4	5	6	7
2.16	A person with the right knowledge and motivation should be encouraged to act on this venture idea	1	2	3	4	5	6	7
2.17	This venture idea is a good business opportunity (for the right person or team)	1	2	3	4	5	6	7
2.18	Someone could turn this venture idea into a successful business	1	2	3	4	5	6	7
2.19	If someone failed with this venture idea, it would be due to other factors than the idea itself	1	2	3	4	5	6	7

APPENDIX G

- Chapter 2 (Article 1) Supplementary Material -

Salience placed on desirability relative to feasibility scale and factor loadings

Scale item													Label	Loading
Choose the position on the scale that, in your view, best describes which characteristics represent a <u>more positive</u> business opportunity.														
Low profit potential in a very uncompetitive market	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	High profit potential in a very competitive market	DVSF1	0.676
Product is less attractive to customers, and your personal investment is low	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	Product is very attractive to customers, and your personal investment is high	DVSF2	0.740
Choose the position on the scale that, in your view, best describes which opportunity characteristics represent a <u>more promising</u> business opportunity.														
Low profit potential in a very uncompetitive market	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	High profit potential in a very competitive market	DVSF3	0.639
Product is less attractive to customers, and your personal investment is low	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	Product is very attractive to customers, and your personal investment is high	DVSF4	0.663
Choose the position on the scale that, in your view, best describes which opportunity characteristics represent a more realistic alternative to wage employment.														
Low profit potential in a very uncompetitive market	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	High profit potential in a very competitive market	DVSF5	0.753
Product is less attractive to customers, and your personal investment is low	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	Product is very attractive to customers, and your personal investment is high	DVSF6	0.630

Note: Composite reliability=0.869; Alpha=0.850

INSTRUMENTAL VARIABLE ARGUMENTS FOR RELEVANCE AND EXOGENEITY

For impulsivity, we relied on four instrumental variables (IVs); two demographic IVs deemed external to our theorized model: age, gender; and two, 5-point Likert-type instruments capturing the extent to which an individual generally feels “excited” and “distressed” in their day-to-day activities. Context influences impulsivity symptoms (Berg et al., 2015), and the abovementioned demographic instruments have been found to predict varying levels of impulsivity (Antshel, 2018). Furthermore, studies have shown that these demographic instruments do not influence attitudes towards entrepreneurship (Schlaegel and Koenig, 2014), nor have they been found to influence the evaluation of opportunities through joint considerations of desirability and feasibility (Autio et al., 2013; Fitzsimmons and Douglas, 2011). Similarly, affect–especially positive affect such as enthusiasm and excitement have been found to encourage impulsive behaviors (Berg et al., 2015; Frijda et al., 2014), and since multidimensional impulsivity represents distinct “pathways” to impulsive behavioral manifestations (Berg et al., 2015; Sharma et al., 2014), we posit that the general affect instruments will only relate to our salience placed on desirability relative to feasibility variable through the impulsivity dimensions. For example, while fear may attract a focus on the desirable aspects of an event through sensation seeking, the same emotion may lead to a focus on the challenges of an event through higher urgency (Whiteside and Lynam, 2001), thus highlighting the relevance of impulsivity as a mediating mechanism.

For the salience placed on desirability relative to feasibility, we relied on four IVs external to our model: (1) two 7-point Likert-type IVs capturing the preference for entrepreneurship over alternative careers (Krueger, 1993); and (2) two 7-point Likert-type IVs capturing learning: I am good at learning from strategic/competitive mistakes in my business, and I am good at changing my business strategy midstream as I get a sense of the likely effectiveness of my actions. Since a large body of work has demonstrated that both attitude towards entrepreneurship (i.e., entrepreneurial preference) and knowledge or expertise acquisition (i.e., learning) directly influence desirability and feasibility considerations (McMullen and Shepherd, 2006; Sarasvathy, 2001); and, only through this mechanism, impact EI and EBE (Schlaegel and Koenig, 2014; Zapkau et al., 2015), these constructs are theorized to meet the relevance and exogeneity criteria.

COMMON METHOD BIAS

We also specifically tested for common method bias (CMB) using the CFA marker technique by Williams et al. (2010). We compared a series of five nested models that included a theoretically unrelated marker variable: an indirect measure of respondents' hostile attitude towards others (3-item, Likert-type scale; 1=not at all hostile, 5=extremely hostile) (Watson and Clark 1994). Comparing the baseline model with a model assuming tau equivalence of method factor effects on the indicators of our substantive constructs (Method-C model), as well as a model that does not assume equivalence (Method-U model), showed that the marker variable's impact on the indicators was unlikely to be uniform across all items (Method-C vs. Method-U model; $\Delta\chi^2$=151.345, p<0.001). Therefore, we retained the Method-U model and compared it to a restricted model (Method-R model) which constrains the correlations among the substantive constructs to the estimates of the baseline model. This test indicated that the marker variable did not significantly bias the estimates of substantive factor correlations (Method-U vs. Method-R model; $\Delta\chi^2$=0.288, p=0.866), thus strengthening evidence that CMB is unlikely to threaten the validity of our study.

APPENDIX H

- Chapter 3 (Paper 2) Supplementary Material -

RE-ASSESSED MODEL USING THE 16-ITEM SHORT IMPULSIVITY SCALE

Following Wiklund et al. (2017), I re-assessed the hypothesized model using the 16-item short UPPS scale (Cyders, Littlefield, Coffey, & Karyadi, 2014). Composite reliability for each short-form impulsivity scale was 0.753, 0.786, 0.700, and 0.849 for sensation-seeking, lack of premeditation, lack of perseverance, and urgency, respectively. Thus, this short-form scale showed acceptable reliability (Nunnally 1978). As illustrated in the Table below, model fit and structural paths were largely analogous to that reported in the main analyses, indicating the results are reasonably robust to variations in the measurement of impulsivity. However, one non-hypothesized path did change. The lack of perseverance-disinhibition path became negative and significant (β=-0.221, p=0.032). A possible explanation for this result is contained in the main paper.

Structural model results for short-form impulsivity scale

Statistic	Estimate
RMSEA	0.053
SRMR	0.080
χ^2/df	1.560
Sensation-Seeking→Disinhibition	-0.329**
Lack of Premeditation→Disinhibition	0.305*
Lack of Perseverance→Disinhibition	-0.221*
Urgency→ Disinhibition	0.085
Sensation-Seeking→Hedonic impulses	-0.144
Lack of Premeditation→Hedonic impulses	0.234*
Lack of Perseverance→Hedonic impulses	-0.306*
Urgency→Hedonic impulses	0.252*
Sensation-Seeking→VIQ	-0.120
Lack of Premeditation→VIQ	0.360
Lack of Perseverance→VIQ	-0.335
Urgency→VIQ	-0.310
Disinhibition→VIQ	-0.528**
Hedonic impulses→VIQ	0.340*

Notes: ^<0.1; *p<0.05; **p<0.01; ***p<0.005; β=Standardized coefficients, estimated by standardizing data prior to analyses (Klein & Moosbrugger, 2000; Maslowsky et al., 2015).

INSTRUMENTAL VARIABLE RELEVANCE, EXOGENEITY AND ENDOGENEITY TESTS

Age and gender were employed as relevant and exogenous instrumental variables (IVs). The Wald test illustrated that age and gender were significant predictors (Wald test>10) of each impulsivity dimension except urgency (Anderson, 2018). I thus continued the analysis only on the three remaining impulsivity dimensions. To test whether the IVs are properly excluded from the dual processes, I performed Sargan-Hansen tests of overidentifying restrictions, and assessed error term covariances (Sande & Ghosh, 2018). No substantive

misspecification (CMIN/DF<3.0), and no significant IV-dual process variable error term covariances were observed, indicating the IVs are properly excluded. These results allowed me to conclude that the IVs would be effective for conducting endogeneity tests. I thus piecewise constrained each impulsivity-dual process covariance to zero and performed Hausman tests for rejecting the null of exogeneity. As illustrated in the Table below, no significant covariances were found, providing evidence that the effects of the sensation-seeking, lack of deliberation and lack of persistence impulsivity traits on hedonic impulses and disinhibition are due to multidimensional impulsivity and not CMV, simultaneity, or alternative explanations (Antonakis, Bendahan, Jacquart & Lalive, 2010).

Hausman (chi-squared difference) tests

Covariance	$\Delta\chi^2$	DF	Significance
Sensation-seeking~~disinhibition	0.519	1	0.471
Sensation-seeking~~hedonic impulses	0.258	1	0.612
Lack of Premeditation~~disinhibition	0.301	1	0.583
Lack of Premeditation~~hedonic impulses	0.196	1	0.658
Lack of Perseverance~~disinhibition	0.723	1	0.395
Lack of Perseverance~~hedonic impulses	0.134	1	0.714