

TO PREDICT, OR TO CONTROL THAT IS THE QUESTION:

The influence of intolerance of uncertainty on entrepreneurial decision-making behaviour

Henk Geert Vreugdenhil
University of Twente

August 2020

Abstract: Despite the irreducible presence of uncertainty in entrepreneurship, how an entrepreneur should make decisions when facing it remains a matter of debate. Both sides of this argument are captured in the theory of effectuation, however, within effectuation literature it remains insufficiently clear what leads to effectual or causal decision-making behaviour. This research explores personal-level antecedents of entrepreneurial decision-making using the dispositional trait intolerance of uncertainty while paying special attention to the role of the entrepreneur's gender. Based on a data set gathered in South-Africa and The Netherlands responses of 242 entrepreneurs in total were assessed via quantitative methods. The results show that intolerance of uncertainty is positively correlated with causation but not effectuation. The sub-constructs inhibitory anxiety and prospective anxiety are positively related to effectuation and causation respectively. No significant effects based on gender are found. This research partly fills the gap in personal-level antecedents in effectuation literature. The results show that intolerance of uncertainty and inhibitory anxiety significantly predict causation whereas prospective anxiety is positively related to effectuation. As such, this research contributes to both effectuation and intolerance of uncertainty literature. However, future research is needed to validate the results and to further identify personal-level antecedents of entrepreneurial decision-making.

Keywords Entrepreneurship, Entrepreneur, Decision-Making, Effectuation, Causation, Intolerance of Uncertainty, Gender

MSc Business Administration
NIKOS Department of Entrepreneurship, Innovation and Strategy
Faculty of Behavioural, Management and Social Sciences

First supervisor: Dr. M.R. Stienstra
Second supervisor: Drs. P. Bliet

A. PREFACE

This thesis is the closing assignment of my Master's degree in Business Administration, an achievement I am unbelievably proud of. Although wanting to go to an university for both my bachelor as well as my master, I was not able to due to family circumstances. As a result I had to obtain my bachelor's degree at an university of applied sciences. During this period I was determined to follow and obtain a master's degree. This thesis is the final part of this goal which I set multiple years ago. I am proud of both my accomplishments during the premaster as well as the during the master itself.

The subject of this thesis (effectuation) grabbed my attention during the first course it was taught. This was still during the premaster. Despite following several different courses with compelling theories and ideas, I remained intrigued with effectuation. I am therefore glad I was able to conduct my final research in this subject area.

The circumstances under which this thesis was written were unique. Indeed, the Covid-19 virus has left (probably) a permanent mark all over the world, disrupting everything temporarily or otherwise. As a result, the process was more solitary than I would have liked. Moreover, the data gathering process became nearly impossible. This is something that I personally regret, although I was able to finish the research and have found novel results, it felt less as 'my' research. Furthermore, a larger sample would have provided more possibilities and possibly different results.

Through this preface, I would like to thank my supervisor Dr. Stienstra. Despite the different conditions he found the time to respond quickly to questions and provided me with helpful feedback albeit more distant due to the safety precautions. Nevertheless, his help was absolutely important and helped me during this process. Moreover, he made it possible that I could conduct research in a subject area that had spiked my interest early on.

Lastly, I would like to thank everybody who has helped or supported me during the process of writing this thesis. Amongst them are my friends, classmates, entrepreneurs and others who have helped me to gather the data or gave valuable advice during the writing process. I want to specially mention my wife Renske as she provided vital support during this process.

Henk Geert Vreugdenhil

Zwolle, August 2020

B. CONTENT LIST

A.	PREFACE.....	2
B.	CONTENT LIST.....	3
C.	LIST OF TABLES AND FIGURES.....	5
I.	INTRODUCTION.....	6
II.	THEORETICAL FRAMEWORK.....	8
2.1	THE THEORY OF EFFECTUATION.....	8
2.1.2	CONTRASTING EFFECTUATION AND CAUSATION	10
2.1.3	THE ANTECEDENTS AND BORDERS OF EFFECTUATION	12
2.2	INTOLERANCE OF UNCERTAINTY	12
2.2.1	INTOLERANCE OF UNCERTAINTY AND DECISION-MAKING	13
2.3	GENDER	14
III.	HYPOTHESES	15
3.1	INTOLERANCE OF UNCERTAINTY AND EFFECTUATION	15
3.2	GENDER AND INTOLERANCE OF UNCERTAINTY	16
3.3	THE MODERATING ROLE OF GENDER.....	17
IV.	METHODOLOGY.....	18
4.1	SAMPLE.....	18
4.1.1	THE GATHERING PROCESS	18
4.1.2	DESCRIPTIVE STATISTICS	19
4.2	SAMPLING METHODS.....	19
4.3	METHOD OF ANALYSIS	21
4.3.1	EXPLORATORY FACTOR ANALYSIS.....	21
4.3.2	MULTIPLE REGRESSION AND ITS ASSUMPTIONS.....	22
4.3.2	MANCOVA AND ITS ASSUMPTIONS.....	23
4.4	CONTROL VARIABLES	24
V.	RESULTS.....	25
5.1	EXPLORATORY FACTOR ANALYSIS	25
5.1.1	ASSUMPTIONS.....	25
5.1.2	FINDINGS.....	25
5.2	DATA ANALYSIS	26
5.2.1	MULTIPLE REGRESSION ASSUMPTIONS	26
5.2.2	MANCOVA ASSUMPTIONS	27
5.3	HYPOTHESES TESTING	28
5.4	CONTROL VARIABLES.....	30
5.5	RESULT VALIDATION	31
VI.	DISCUSSION.....	32
6.2	THEORETICAL CONTRIBUTIONS.....	35
6.3	PRACTICAL CONTRIBUTIONS.....	35
6.4	LIMITATIONS	36
6.5	AVENUES FOR FUTURE RESEARCH	36
VII.	CONCLUSION.....	37
VIII.	REFERENCES.....	39
IX.	APPENDICES.....	46
A:	MEASUREMENT SCALES.....	46
B.	CRONBACH'S ALPHA	48
C.	BARLETT'S TEST OF SPHERICITY, KMO & MSA.....	48
D.	EXPLORATORY FACTOR ANALYSIS.....	49
E.	MULTIPLE REGRESSION ASSUMPTIONS	52

F. BOXPLOT IDENTIFYING OUTLIERS	62
G. HIERARCHICAL REGRESSION RESULTS OF CAUSATION ADJUSTED SCALE.....	62
H. RESULTS STEPWISE REGRESSION	63

C. LIST OF TABLES AND FIGURES

Table number	Table name	Page number
Table 1	Contrasting the Causal and Effectual positions	11
Table 2	Descriptive statistics total sample	20
Table 3	Descriptive statistics factors	26
Table 4	Correlation table	27
Table 5	Results hierarchical regression	29
Table 6	Results MANCOVA	30
Table 7	Overview of results	31

Figure number	Figure name	Page number
Figure 1	Visualization of Research Questions	8
Figure 2	Effectuation process	9
Figure 3	Causation process	10
Figure 4	Visualisation of the proposed hypotheses	17

I. INTRODUCTION

The irreducible presence of uncertainty is central to entrepreneurship research (Gunther McGrath, 1999; McMullen & Shepherd, 2006). How an entrepreneur should deal with this uncertainty has become a focal as well as a divisive point in several streams of entrepreneurial research. One of these divided streams is entrepreneurial decision-making literature (Shepherd, Williams, & Patzelt, 2015).

Sarasvathy's (2001) theory of effectuation has risen to prominence in the last two decades (Kitching & Rouse, 2020). This theory juxtaposes both sides of the debate within entrepreneurial decision-making literature (Chris Welter, Mauer, & Wuebker, 2016). The traditional planning school is represented as the causation approach. Uncertain futures are to be predicted based on collected data, rigorous analysis and extensive planning (Delmar & Shane, 2003). The emergent school is represented in the effectual approach. Based on the premise that the future is unpredictable it postulates that one should control what is directly in one's possession rather than trying to predict the unpredictable (Grégoire & Cherchem, 2020; Sarasvathy, 2001).

Despite its prominence, current effectuation literature has been subjected to several criticisms. Initially it was stated that effectual decision-making behaviour is predominantly employed by expert entrepreneurs (e.g. (Dew, Read, Sarasvathy, & Wiltbank, 2009; Read & Sarasvathy, 2005; Sarasvathy, 2001, 2008).

However, who or what an expert entrepreneur is remains unclear (Arend, Sarooghi, & Burkemper, 2015; Read & Sarasvathy, 2005). Moreover, Engel, Dimitrova, Khapova and Elfring (2014) found that effectual decision-making is not strictly reserved to expert entrepreneurs as first expected. Indeed, recent criticisms state that individual level antecedents that contribute to, or diminish, effectual decision-making behaviour remain unclear within existing effectuation literature (Arend et al., 2015; Engel et al., 2014; Grégoire & Cherchem, 2020; Perry, Chandler, & Markova, 2012; Reymen et al., 2015). Perry et al. (2012) further add to this by criticising effectuation for a lack of connections with other established constructs.

Behaviour, such as decision-making, can be considered "(...) a function of the person and the situation" (Rauch & Frese, 2007 p.360). Within psychology, traits are used to distinguish between individuals via a small set of dispositions that are stable across multiple situations (Mischel & Shoda, 1998). Intolerance of uncertainty is such a dispositional trait which could provide constant differences between individuals in situations where decisions are made vis-à-vis uncertainty (Carleton et al., 2016). This research addresses the paucity of personal-level antecedents and lack of connections to previously established concepts in current effectuation literature by exploring the re-

relationship between the entrepreneur's intolerance of uncertainty and his decision-making behaviour.

Intolerance of uncertainty is an individual's predisposition to react negatively to the presence of uncertainty in a situation or environment (Carleton, Norton, & Asmundson, 2007). Originally, intolerance of uncertainty was discovered by Freeston, Rhéaume, Letarte, Dugas and Ladouceur (1994) in their examination to better understand what causes worry. Subsequent research showed that intolerance of uncertainty is a discriminative difference between individuals regarding multiple anxiety disorders (Helsen, Van Den Bussche, Vlaeyen, & Goubert, 2013). Initially the scale was exclusively used in clinical samples, later research has shown that the measure is applicable to non-clinical samples as well (Dugas, Schwartz, & Francis, 2004). The extent to which an individual can tolerate uncertainty profoundly influences behaviour (Carleton et al., 2016). However, research on how this intolerance of uncertainty influences behaviour remains scarce as the majority of research is focussed on the cognitive aspects (Thibodeau, Carleton, Gómez-Pérez, & Asmundson, 2013). In contrast, this research uses the intolerance of uncertainty measure to explore its possible relationship with effectuation as a personal-level antecedent. Indeed, intolerance of uncertainty is applicable to non-clinical samples, influences (decision-making) behaviour and could be a discriminatory factor between individuals.

In examining the influence of uncertainty tolerance on behaviour, this research pays special attention to the role of the entrepreneur's gender. Previous research in the streams of entrepreneurship (e.g. (Gupta, Turban, & Bhawe, 2008; Gupta, Turban, Wasti, & Sikdar, 2009; Murnieks, Cardon, & Haynie, 2020; Sexton & Bowman-Upton, 1990), decision-making (e.g. (Cornwall, Byrne, & Worthy, 2018; Koch, D'Mello, & Sackett, 2015), effectuation (e.g. (Bezerra de Melo, Da Silva, & De Almeida, 2019; Frigotto & Della Valle, 2018) and intolerance of uncertainty (e.g. (Bottesi, Martignon, Cerea, & Ghisi, 2018; Doruk, Dugenci, Ersöz, & Öznur, 2015) has focussed on the role of gender and its possible effect on the concepts. Despite the presence of contradictory findings, each stream holds pervasive stereotypes on the differences between men and women (Doruk et al., 2015; Frigotto & Della Valle, 2018; Gupta et al., 2009; Robichaud, Dugas, & Conway, 2003). Within entrepreneurial research the stereotype is widely accepted that female entrepreneurs are less agentic than their male counterparts (Gupta et al., 2008). Such stereotypes affect behaviour as men and women want to conform to their corresponding stereotype (Heilman, 2012). Indeed women tend to assess themselves as more risk and uncertainty averse than men, in line with their prescriptive stereotype (Brighetti & Lucarelli, 2015). Since gender stereotypes can cause alterations in behaviour as well as influence self-assessment, it is expected that gender stereotypes influence both concepts of the study.

This research aims to explore the gap in current effectuation literature regarding the lack of undisputed personal-level antecedents of effectual behaviour. It uses the concept of intolerance of uncertainty and gender. To guide this research, the following research questions are drawn up: 1) *To what extent is the entrepreneur's dominant decision-making logic influenced by his intolerance of uncertainty?* 2) *To what extent does the gender of the entrepreneur influence his self-assessment of intolerance of uncertainty?* 3) *To what extent does the gender of the entrepreneur moderate the relationship between intolerance of uncertainty and decision-making?* The research questions are visualized in figure 1.

This thesis contains the following sections. First of all, in the theoretical framework, the concepts of effectuation and causation, intolerance for uncertainty and gender are described in greater detail. The theoretical framework is followed with the hypotheses that are drawn up based on the reviewed literature. The methods section describes the methodology used in this research which is followed by the results. The results are presented and the implications, limitations and future directions for research

are described. Lastly, the conclusion answers the research questions stated above.

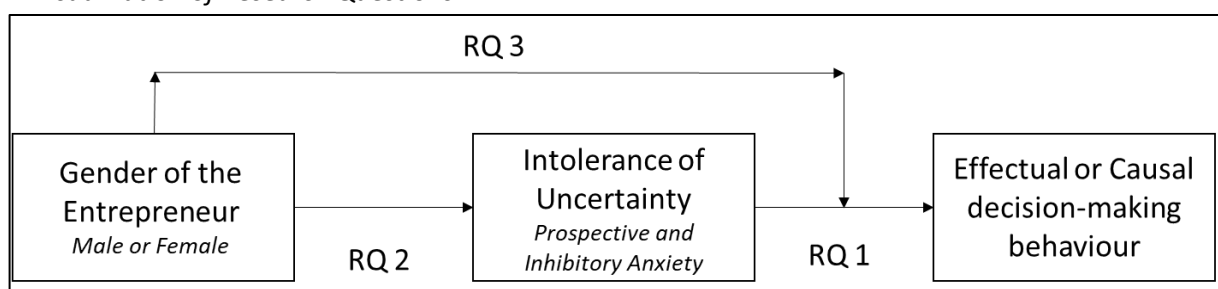
II. THEORETICAL FRAMEWORK

2.1 THE THEORY OF EFFECTUATION

Effectuation is a theory of entrepreneurial behaviour (Grégoire & Cherchem, 2020), it delineates two opposing (yet not mutually exclusive) decision-making logics: causation and effectuation (Perry et al., 2012). The basis for the distinction between both logics is how an entrepreneur manages uncertainty (Brettel, Mauer, Engelen, & Küpper, 2012). Causation mirrors the planning school, a rational approach towards uncertainty that uses extensive analyses, planning and prediction to exert control (Wiltbank, Dew, Read, & Sarasvathy, 2006). Sarasvathy (2001) defined causation as: "The causation process takes a particular effect as given and focus on selecting between means to create that effect" (p.245). Contrasting causation is effectuation, which follows the learning school. This strategic management school minimizes the use of prediction and employs experimentation and quick adaptation to control the uncertain environment (Karami,

Figure 1

Visualization of Research Questions



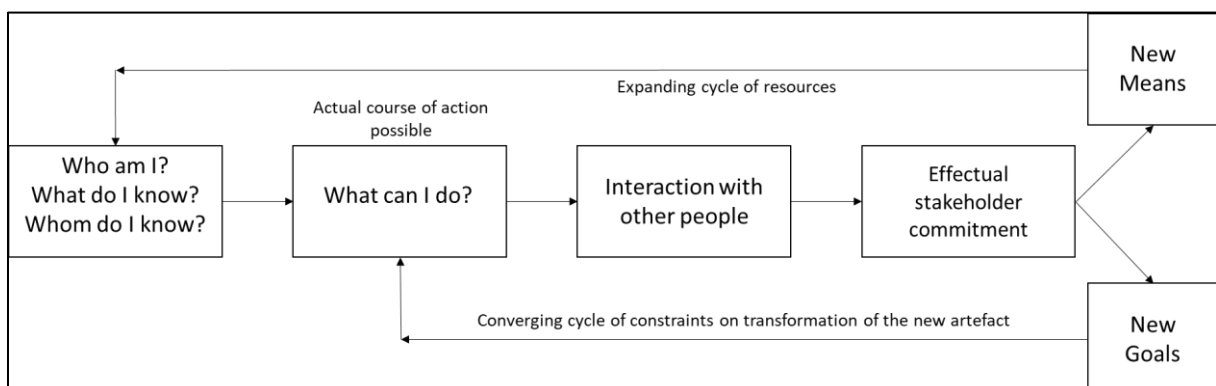
Wooliscroft, & McNeill, 2019; Wiltbank et al., 2006). Sarasvathy (2001) defined the effectual approach as: “Effectuation processes take a set of means as given and focus on selecting between possible effects that can be created with that set of means” (p.245)

The effectual process relies on two important assumptions. First of all, within effectuation, it is assumed that the future is inherently unknown and unknowable (Arend et al., 2015; Dew et al., 2009; Fisher, 2012). This is recognized as ‘true’ or ‘Knightian’ uncertainty (Grégoire & Cherchem, 2020). As a result, it is (nearly) impossible to predict the future (Kitching & Rouse, 2020). Secondly, effectuation assumes that the entrepreneur is able to create and construct new opportunities (Fisher, 2012; Perry et al., 2012; Welter et al., 2016). Based on these two assumptions, the effectual process starts with the means available to the entrepreneur. These means are who the entrepreneur is, what the entrepreneur knows and whom he knows. The assessment of the available means provides the entrepreneur with artefacts he can create. Interaction with

people in the network of the entrepreneur can lead to new stakeholders. The inclusion of new partners in the firm has two possible consequences. First of all, new partners provide new means and thus help to expand the possibilities of the firm. Secondly, new stakeholders can alter the goals of the firm and lead to revaluing the process (Dew et al., 2009; Fisher, 2012; Chris Welter et al., 2016). The effectual process is shown in figure 2.

The assumptions on which the causal approach relies are the inverse (Sarasvathy, 2008). Here the future is seen as a continuation of the past (Dew et al., 2009). As a result, Dew et al. (2009) argue, it is possible, advantageous and necessary to accurately predict the future. Moreover, in this view, planning is perceived as useful activity in uncertain situations (Alvarez & Barney, 2005). Secondly, within the traditional planning approach, it is assumed that entrepreneurial opportunities pre-exist and it is the responsibility of the entrepreneur to discover and exploit them (Fisher, 2012; Shane & Venkataraman, 2000). Thus, opportunities are discovered as the result of a deliberate search

Figure 2
Effectuation process, adapted from (Fisher, 2012; Sarasvathy, 2001)



(Perry et al., 2012). As a consequence, the causation process starts with the recognition and evaluation of opportunities. This leads to the identification of a suitable opportunity upon which the entrepreneur basis objectives and develops a plan to capitalize on the opportunity. In the following stage, the entrepreneur gathers the required resources and creates the artefact that fulfils the opportunity. Lastly, the artefact enters the marketplace, the marketplace is also the primary source of feedback on the artefact. This feedback results in further development of the artefact (Dew et al., 2009; Fisher, 2012; Sarasvathy, 2001; Shane & Venkataraman, 2000). The causal process is shown in figure 3.

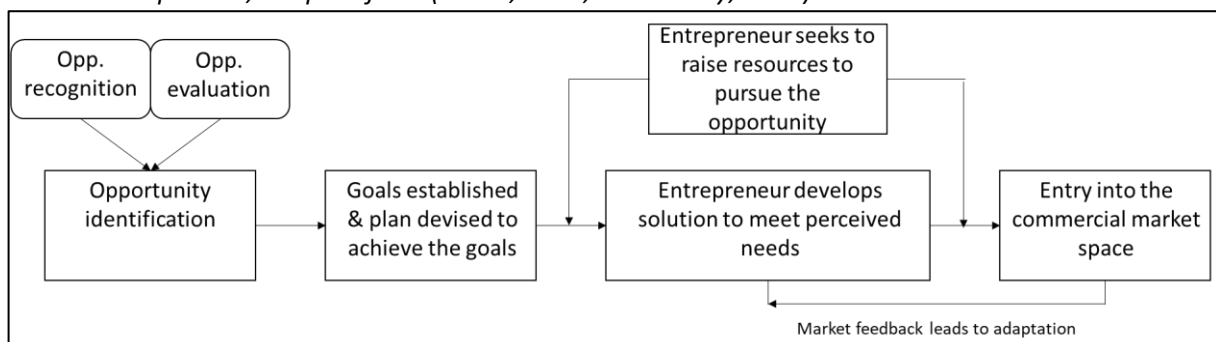
2.1.2 Contrasting effectuation and causation

Juxtaposing the behaviours associated with effectuation and causation creates a deeper understanding of the constructs. Effectuation is a formative construct (Chandler, DeTienne, McKelvie, & Mumford, 2011; McKelvie, Chandler, DeTienne, & Johansson, 2020) that consists of five behavioural principles (Sarasvathy, 2008).

The *bird-in-hand* principle states that effectuation is a means driven decision-making logic (Sarasvathy, 2001; Welter et al., 2016). The objectives of the entrepreneur come into being based on the available means (Dew et al., 2009). The effectual entrepreneur can gain control of additional means through establishing and using strategic relationships (Fisher, 2012). On the other hand, the causal process is goal-driven (Sarasvathy, 2001). The outcome is predefined and the causal entrepreneur selects between means to achieve the already determined objective(s) (Chandler et al., 2011; Fisher, 2012).

The second principle is *affordable-loss* (Sarasvathy, 2008). Commitment to the project or firm is based on what each stakeholder is willing to lose (Dew et al., 2009; Read & Sarasvathy, 2005). Conversely, in the causal approach, commitment is based on the prospective gains of a project or firm. This approach is typifying for the neoclassical rational decision-making approaches that are based on prediction (Karami et al., 2019).

Figure 3
Causation process, adapted from (Fisher, 2012; Sarasvathy, 2001)



The *crazy-quilt* principle is the third convention (Sarasvathy, 2008). The effectual entrepreneur is open to collaborating with each stakeholder that is willing to commit to the project (Read & Sarasvathy, 2005). These partnerships have the potential to have a profound effect on the firm. Indeed, new partners provide new means and goals and thus allow for the creation of new opportunities (Chandler et al., 2011; Fisher, 2012). Within causation outsiders are not viewed as potential partners but primarily as competitors (Sarasvathy, 2001). This approach is clearly visible in instruments used for analyses and prediction such as Porter's (2008) five forces model. Indeed, competitive analysis is an important part of the causal approach and often makes up a sizeable part of

business plans (Chandler et al., 2011; Read & Sarasvathy, 2005).

The following principle is called *lemonade* (Sarasvathy, 2008). Since the effectuator does not have predetermined goals the entrepreneur can leverage contingencies as they arise (Fisher, 2012). Within the causal view, contingencies should be avoided through extensive analyses and prediction (Chandler et al., 2011; Phaal, 2004). For example through the use of scenario-planning and roadmapping (Siebelink, Halman, & Hofman, 2016).

The *pilot-in-the-plane* is the last principle (Sarasvathy, 2001). As mentioned before, effectuation is based on the pragmatist perspective that the world can be made through entrepreneurial action (Arend et al., 2015; Grégoire

Table 1

Contrasting the Causal and Effectual positions. Copied and adapted from (Read & Sarasvathy, 2005 p.52)

Issue	Casual position	Effectual position
View of the Future	Prediction. (...) the future is a continuation of the past that can be acceptably and usefully predicted	Creation. (...) The future is contingent on actions by wilful agents, largely non-existent and a residual of actions taken. Prediction is unimportant as a result
Basis for commitment	Should. Commit as a course of maximizing, analysis and what should be done	Can. (...) do what you can (what you are able to do) rather than what your prediction says you should.
Basis for taking action and acquiring stakeholders	Goals. (...) determine sub-goals. Commitment to particular sub-goals determined by larger goal constrained by means. Goals determine actions, including individuals brought on board.	Means. Actions emerge from means and imagination. Stakeholder commitments and actions lead to specific sub-goals. Feedback from achievement/non-achievement of sub-goals lead to design of major goals.
Planning	Commitment. Path selection is limited to those that support a commitment to an existing goal	Contingency. Paths are chosen that allow more possible options later in the process, enabling strategy shift as necessary
Predisposition towards risk	Expected Return. (...) Pursue the (risk adjusted) maximum opportunity, but not focus on downside risk	Affordable Loss. (...) [Do] not risk more than can afford to be lost. Here, the calculation is focused on the downside potential
Attitude toward outside firms	Competition. (...) be concerned with competition and constrain task relationships with customers and suppliers to just what is necessary.	Partnership. (...) Create a market jointly, building YOUR market together with customers, suppliers and even prospective competitors.

& Cherchem, 2020; Karami et al., 2019). The causal approach on the other hand is based on the believe that opportunities are already 'out there' and are waiting to be discovered (Shane & Venkataraman, 2000). As a result, the effectual entrepreneur aims to *control* the uncertain future, whereas the causal entrepreneur tries to *predict* the uncertain future (Chandler et al., 2011; Read & Sarasvathy, 2005). The differences between effectuation and causation are shown in table 1.

2.1.3 *The antecedents and borders of effectuation*

Originally, Sarasvathy (2001) stated that the effectual decision-making logic was employed by expert entrepreneurs facing uncertainty. The effect of entrepreneurial expertise on the dominant decision-making logic was confirmed by Engel et al., (2014) Dew et al., (2009) and Frese, Geiger and Dost (2020). Further research uncovered additional antecedents of an effectual decision-making logic: self-efficacy and perspective taking (Zhang, Cui, Zhang, Sarasvathy, & Anusha, 2019), perceived uncertainty and management experience (Frese et al., 2020), entrepreneurial self-efficacy (Engel et al., 2014), strategic scoping decisions (Reymen et al., 2015), passion for the product, service or activity (Cannatelli, Pedrini, & Braun, 2019), market dynamism and international experience (Harms & Schiele, 2012), and the strategic business context (Hauser, Eggers, & Guldenberg, 2020).

Moreover, research in the corporate environment has shown that effectuation is applicable in other contexts than just the venture start-up phase (Brettel et al., 2012). Whereas Welter and Kim (2018) showed that the effectual decision-making logic is more effective than causation "until the entrepreneur can accurately predict >75% of the future decisions correctly" (p. 111). As a result, effectuation is applicable beyond the original border condition of Knightian uncertainty (Welter & Kim, 2018).

2.2 INTOLERANCE OF UNCERTAINTY

Intolerance of uncertainty is defined as: "a predisposition to react negatively to an uncertain event or situation independent of its probability of occurrence and of its associated consequences" (Ladouceur, Gosselin, & Dugas, 2000 p.934). The reaction triggered by a high IU can manifests itself in the person's cognition, emotions and/or behaviour. (Dugas, Schwartz, & Francis, 2004). The concept of intolerance of uncertainty has gotten increased attention since the seminal work of Freeston, Rhéaume, Letarte, Dugas and Ladouceur (1994). Originally, IU was primarily used in clinical samples as a key driver of worry (Thibodeau et al., 2013). However, subsequent research found that IU has strong positive correlations with multiple anxiety disorders such as general anxiety disorder, obsessive-compulsive disorder and panic disorder (Carleton et al., 2007; Dugas et al., 2004; Thibodeau et al., 2013). Moreover, the concept has been extensively used in re-

search in healthcare fields and among (aspiring) medical professionals due to the pronounced presence of uncertainty in these areas (Hillen, Gutheil, Strout, Smets, & Han, 2017; Strout et al., 2018).

IU consists of two sub-constructs, namely prospective anxiety and inhibitory anxiety (Carleton et al., 2007). Hong and Lee (2015) describe these as: “Prospective IU seems to represent a desire for predictability of future events triggered by anxious apprehension about uncertainty (...) Conversely, inhibitory IU appears to measure paralysis and impaired functioning arising from uncertainty” (p. 606). Although intolerance of uncertainty is one trait, the two components describe different responses when facing uncertainty (Hale et al., 2016). Prospective anxiety is linked with worrying and concerns regarding an uncertain future whereas inhibitory anxiety is linked with (in)action vis-à-vis uncertainty (Hill & Hamm, 2019).

Extant research has established multiple effects of a high IU. Indeed, individuals with a high intolerance of uncertainty have debilitated problem solving skills (Carleton et al., 2007), impaired performance in uncertain tasks (Buhr & Dugas, 2002), find ambiguous circumstances stressful (Basevitz, Pushkar, Chaikelson, Conway, & Dalton, 2008) and tend to avoid ambiguous situations in general (Carleton et al., 2007).

Despite its origins in a clinical setting, intolerance of uncertainty is applicable to nonclinical populations as well (Dugas et al., 2004; Thibodeau et al., 2013). Angehrn, Krakauer,

and Carleton (2020) found that the correlation between intolerance of uncertainty and several anxiety disorders remains in nonclinical samples with low reported levels of IU. Moreover, extant research indicates that IU has a significant effect on decision-making behaviour across clinical and nonclinical populations alike (Carleton et al., 2016).

2.2.1 Intolerance of uncertainty and decision-making

Despite its possible transdiagnostic role, research focussed on the behavioural effects of IU on decision-making is scant (Carleton et al., 2016; Thibodeau et al., 2013). Nevertheless, several effects have been identified. Firstly, people with a higher intolerance of uncertainty favour options with a higher probability with lower rewards than options with a lower probability with higher rewards (Luhmann, Ishida, & Hajcak, 2011; Tanovic, Hajcak, & Joormann, 2018). Secondly, individuals with a high intolerance of uncertainty gather more additional information before coming to a conclusion (Helsen et al., 2013). Most likely attempting to lower the uncertainty they are facing (Ladouceur, Talbot, & Dugas, 1997 as cited by Luhmann et al., 2011). However, despite gathering extra information, high IU individuals are less confident about decisions involving great risk while they are less likely to alter their decisions after receiving new data (Shihata, McEvoy, Mullan, & Carleton, 2016). Furthermore, individuals with a high self-reported IU demonstrate behaviour linked with lowering

uncertainty (Carleton et al., 2016). Lastly, Thibodeau et al. (2013) showed that subjects with a high IU completed a task slower while failing to make significantly less errors.

2.3 GENDER

When assessing the influence of gender, it is important to distinguish gender from sex. The latter refers to what people are born as, whereas the former refers to behaviour which is repeatedly shown in interaction with other people (Gupta et al., 2009).

Within in society there are certain generalizations regarding the behaviours, traits and characteristics based on someone's gender, these are called gender stereotypes (Heilman, 2012). Gender stereotypes can be prescriptive or descriptive. The former describes how men and women *should* behave and which characteristics one should possess, the latter concerns what men and women *are* and what makes them different (Heilman, 2012). These stereotypes are omnipresent in societies across cultures and profoundly influence how people view themselves (Heilman, 2012; Murnieks et al., 2020). Moreover, these stereotypes strongly and unconsciously influence behaviour and cognition (Gupta et al., 2008). This influence on behaviour stems from the negative effects that one faces when they fail to conform to the prescriptive stereotypes (Heilman, 2012; Rudman & Glick, 2001). As a result, the stereotypes can lead to self-defeating behaviour in an attempt to conform to the prescribed patterns (Heilman, 2012). With regards to the

actual stereotypes; men are believed to be agentic, i.e. they are confident, independent, assertive and controlling, ambitious and dominant (Heilman, 2012; Koch et al., 2015). Women are characterized by communality, thus: they are considerate, kind, caring, collaborative, warm, friendly and obedient (Heilman, 2012; Koch et al., 2015).

The field of entrepreneurship is considered a gendered field (Murnieks et al., 2020). Indeed, the characteristics associated with an entrepreneur are predominantly masculine (Brighetti & Lucarelli, 2015). Gupta et al. (2009) found that an individual's entrepreneurial intentions are related to their gender when entrepreneurship is presented as masculine. Moreover, female entrepreneurs are seen as less competent, have a harder time acquiring resources and are less likely to gather funding (Guzman & Kacperczyk, 2019).

The influence of gender on intolerance of uncertainty consists of mixed results (Strout et al., 2018). For example, Doruk, Dugenci, Ersöz and Öznur (2015) found that female students had a higher IU compared to their male counterparts, whereas others found no correlation between gender and IU (Carleton et al., 2016; Strout et al., 2018). As a result, the effect gender on intolerance of uncertainty remains unclear (Roma & Hope, 2017). Nevertheless, Doruk et al. (2015) showed that the actions female students are more negatively impacted by uncertainty and resort to gender stereotypical coping styles. The female students employed more planning, reinterpretation, emotional support

and venting as coping styles whereas the male students used humour, substance abuse and denial (Doruk et al., 2015).

With regard to decision-making, it is assumed that women are more risk-averse than men (Brindley, 2005). However, Brighetti and Lucarelli (2015) found that women do not behave more risk-averse when facing uncertain decisions than men but they do assess themselves as more risk-averse compared to males. This finding further substantiates the position that men and women (un)consciously adhere to gender stereotypes when assessing themselves. Van Staveren (2014) noted that female traders employed more research before reaching a decision when faced with uncertainty than their male counterparts. Based on this she concludes that women are more aware of, or are more likely to, acknowledge uncertainty than men (Van Staveren, 2014). Moreover, men and women tend to react more stereotypically when a decision is to be made with opposite gender (Van Staveren, 2014).

III. HYPOTHESES

This section describes the hypotheses that are drawn up based on the theoretical concepts explored in the previous section. Based on these hypotheses a theoretical model is drawn up (figure 4) which is a more detailed model that includes all hypotheses.

3.1 INTOLERANCE OF UNCERTAINTY AND EFFECTUATION

Intolerance of uncertainty influences behaviour in both clinical and nonclinical samples (Dugas et al., 2004). Individuals with a high intolerance of uncertainty have shown impaired problem solving, inaction and even avoidance of uncertain situations (Buhr & Dugas, 2002; Carleton et al., 2007). Moreover, when faced with ambiguous situations, people with a high IU have an increased desire for predictability and information whereas they are more unlikely to be willing to wait for future uncertain rewards (Helsen et al., 2013; Luhmann et al., 2011).

Effectuation and causation have opposite methods of dealing with uncertainty. The effectual entrepreneur eagerly accepts uncertainty whereas the causal entrepreneur aims to predict and therefore reduce the uncertainty (Reymen et al., 2015). Indeed, "in causal calculations, there is an explicit effort to avoid unpleasant surprises – even, as Denrell and March (2001) argued, to avoid all surprises, positive and negative." (Dew et al., 2009 p.293).

The two dimensions of intolerance of uncertainty, prospective and inhibitory anxiety, have a different focus (Carleton et al., 2016). Indeed, the inhibitory aspect refers to the behavioural aspect of IU whereas prospective anxiety impacts cognition (Thibodeau et al., 2013). Despite the different focus the sub-constructs have, it is expected that both factors affect the

dominant decision-making logic of the entrepreneur in similar fashion since cognition as well as behaviour are important elements of decision-making (Johnson & Busemeyer, 2010). Therefore, it is hypothesized that entrepreneurs with a high intolerance of uncertainty employ causal decision-making behaviours. Moreover, it is expected both inhibitory- and prospective anxiety correlate positively with the causal decision-making logics.

H1_a: Intolerance of uncertainty is significantly positively related to causal decision-making.

H1_b: Inhibitory anxiety is significantly positively related to causal decision-making.

H1_c: Prospective anxiety is significantly positively related to causal decision-making.

Individuals with a lower intolerance of uncertainty are more willing to wait longer for ambiguous rewards (Luhmann et al., 2011). Moreover, they do not perceive ambiguous situations as threatening which in turn does not lead to impaired problem solving or inaction. Indeed, causation and effectuation can be contrasted in their attitude towards uncertainty (Reymen et al., 2015). As a result, it is expected that entrepreneurs with a lower intolerance of uncertainty are more likely to adopt effectual decision-making behaviours. Lastly, it is expected that both inhibitory- and prospective anxiety correlate negatively with the effectual decision-making logics.

H1_d: Intolerance of uncertainty is significantly negatively related to effectual decision-making.

H1_e: Inhibitory anxiety is significantly negatively related to effectual decision-making.

H1_f: Prospective anxiety is significantly negatively related to effectual decision-making.

3.2 GENDER AND INTOLERANCE OF UNCERTAINTY

Gender stereotypes influences how individuals assess themselves (Brighetti & Lucarelli, 2015). One of these stereotypes is that women are more uncertainty averse than men (Frigotto & Della Valle, 2018; Sexton & Bowman-Upton, 1990). Moreover, male stereotypes postulate that men are more confident, controlling and assertive (Koch et al., 2015). As Brighetti and Lucarelli (2015) showed: regardless of behaviour, individuals tend to assess themselves congruent with the gender stereotypes. Furthermore, Doruk et al. (2015) found that female students scored significantly higher on certain section of the intolerance of uncertainty scale. Based on the findings of Doruk et al. (2015) and the expectation that people tend to adhere to their respective gender stereotypes, the following hypotheses are drawn up:

H2_a: The female gender is significantly positively related to the intolerance of uncertainty.

H2_b: The female gender is significantly positively related to prospective anxiety.

H2_c: The female gender is significantly positively related to inhibitory anxiety.

H2_d: The male gender is significantly negatively related to the intolerance of uncertainty.

H2_e: The male gender is significantly negatively related to prospective anxiety.

H2_f: The male gender is significantly negatively related to inhibitory anxiety.

3.3 THE MODERATING ROLE OF GENDER

When faced with the opposite gender, people tend to more strictly behave according to their respective gender stereotype (Van Staveren, 2014). Moreover, when women do not display behaviour associated with their stereotype they may be perceived as falling short. To avoid this, women may be enticed to alter her behaviour to conform to the stereotype (Heilman, 2012).

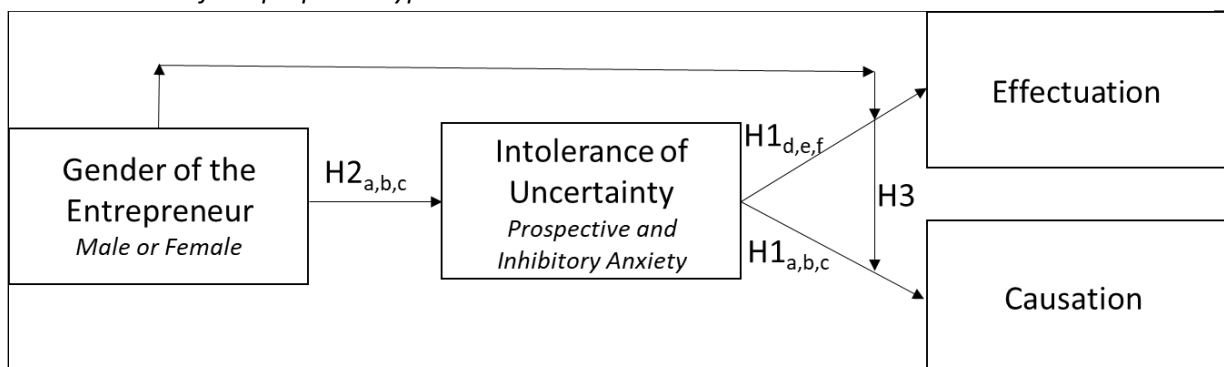
Part of this stereotype is how women deal with uncertainty. As stated by both Van Staveren (2014) and Doruk et al. (2015), when faced with uncertainty, women tend to put more effort in to planning and researching their options before making a decision. This was shown by both Bezerra de Melo, Da Silva and, De Almeida (2019) and Frigotto and Della Valle (2018) who both found that female entrepreneurs were more likely to employ causal decision-making behaviour. This was partly explained by women adhering to gender stereo-

types (Bezerra de Melo et al., 2019). Furthermore, female entrepreneurs may lack support from suppliers, lenders, customers and family members when their behaviour is not congruent with the female stereotype (Gupta et al., 2009). To overcome this, it is likely that female entrepreneurs are more inclined to employ causal behaviour in order to fit in. In other words, female entrepreneurs are more likely to employ causal decision-making methods since more extensive planning and analysis fits the female stereotype. Moreover female entrepreneurs operate in a masculine world, they may (un)consciously alter their behaviour to conform to the gender stereotype. However, the evidence that gender mediates decision-making behaviour under uncertainty is disputed (Frigotto & Della Valle, 2018)

As a result, it is expected that the effect of IU on decision-making is stronger when the entrepreneur identifies themselves as female. Thus the following is hypothesized:

H3: The relationship between Intolerance of uncertainty and decision-making behaviour is moderated by the entrepreneur's gender.

Figure 4
Visualisation of the proposed hypotheses



IV. METHODOLOGY

The aim of this research is to explore the possible relationship between intolerance of uncertainty, gender and decision-making. To this end quantitative data was gathered and analysed. This section describes the sample, how the data was gathered, how it was handled and the statistical techniques that were used.

4.1 SAMPLE

The data is gathered in two different countries, South Africa and The Netherlands. Due to the diversity of the sample, the findings are not restricted to a specific country or place (Polzin, Sanders, & Stavlöt, 2018). Moreover, the differences between the countries make and the nationalities of the entrepreneur allow for the possibility to control for a greater variety of variables.

Regarding the differences between the countries, South Africa is an important regional power on the African continent and has become a part of the BRIC countries (Carmody, 2012). Yet, it struggles with high rates of poverty and unemployment (Urban, 2020). Entrepreneurship and entrepreneurial programmes from (regional) governmental institutions may help the country combat this problem (Madzivhandila & Musara, 2020). The Netherlands on the other hand has low unemployment rates and above average economic growth compared to other European countries (International Monetary Fund, 2019). Entre-

preneurship in The Netherlands is actively promoted by the government where micro sized firms are a dominant feature in the economic landscape (European Commission, 2017).

4.1.1 *The gathering process*

The data used in this research consists of two separately gathered datasets. The first set contains data that was gathered in May, June and July of 2019 in relation to two master theses (Soer, 2019; Van Essen, 2019). The data was collected via an online survey among entrepreneurs who operate in South Africa. Initial approaches were made via incubators and e-mail contact, however, the majority of respondents were met in person prior to filling out the survey. As a result, the total sample of this data set consists of 230 entrepreneurs based in South Africa, not all the respondents have the South African nationality. The second data set is gathered in The Netherlands in May, June and July of 2020. Entrepreneurs, interest groups and incubators were approached via e-mail, online entrepreneur's communities and telephone. These entrepreneurs were asked to fill out the same survey as used in the research conducted in South Africa albeit translated to Dutch. This data set contains 12 usable entries.

The stark difference in size between the datasets is a result of the Covid-19 virus which was at its height in The Netherlands during the period of data collection. Therefore, meeting the entrepreneurs in person was not possible. Moreover, the virus and subsequent government restrictions put great pressure on Dutch

entrepreneurs and their ventures. As a result, the vast majority of the approached entrepreneurs and incubators did not have the time nor the interest in filling out the survey. Furthermore, Dutch governmental institutions and interest groups launched their own researches among the same target group to measure the effects of the Covid-19 virus and the restrictions imposed by the Dutch authorities. These surveys took precedence over this research among various gatekeepers and entrepreneurs, further hampering the data collection.

4.1.2 Descriptive statistics

The data sets are combined and result in a sample size of 242 entrepreneurs, the descriptive statistics of the total sample are shown in table 2. The majority of the sampled entrepreneurs are male (75.6%) with female entrepreneurs accounting for 24.4% of the total. No entrepreneur identified themselves as 'other'. In this sample, the average entrepreneur is 35 years old and has almost 8 years of experience. However, the standard deviations of 11 and 8 years respectively are indicative of a relatively substantial spread in both variables. The majority of the sample has a bachelor's degree (47.5%) and a study background in a non-technical direction (70.7%). 61.2% of the entrepreneurs is active in a tertiary industry and 38.8% is active in a primary or secondary industry. The primary goal of the ventures is for 69% profit and growth, 16.1% started their own venture for self-sustainment, 12% have non-profit and

socially responsible aims whereas 2.9% of the ventures primary aim is fulfilling a passion.

4.2 SAMPLING METHODS

To measure the proposed constructs, several scales are used. As this research employs instruments developed and tested by other researchers, they are assumed to be both valid and reliable. However, the scales were translated from English to Dutch in the sample collected in The Netherlands therefore this research has used several measures to validate these translated scales. The corresponding results are presented in the next chapter.

The two independent variables in this research are gender and intolerance of uncertainty. Gender is measured through asking the entrepreneurs with which gender they identified themselves with. Since the aim of this research is to compare male and female entrepreneurs this concept was measured via questioning the sample whether the identified themselves as male, female or other. Since gender and sex are two different concepts (Gupta et al., 2009), the questionnaire focused on gender rather than sex.

Intolerance of uncertainty was measured via Carleton et al. (2007) 12-item scale (IUS-12) shown in appendix A. This is a shortened version of Freeston et al. (1994) 27-item scale. The 12-item scale measures prospective anxiety and inhibitory anxiety via seven and five items respectively. These items are scored on a Likert scale between 1 and 5 where 1 is not at all characteristic of me and 5 is entirely characteristic

Table 2*Descriptive statistics total sample*

Total Sample Descriptive					
Variable	Mean	Standard Deviation	Categories	Frequency	Percentage
Age	35.36	11.24		242	
Gender			Male	183	75.6
			Female	59	24.4
Nationality			South African	194	80.2
			Dutch	12	5
			Other	36	14.9
Highest obtained degree			High School	35	14.5
			Community College	22	9.1
			Bachelor's Degree	115	47.5
			Honours Degree	8	3.3
			Master's Degree	53	21.9
			Doctorate	9	3.7
Study Background			Technical	71	29.3
			Non-Technical	171	70.7
Amount of ventures founded			1 Venture	92	39
			2 Ventures	74	30.6
			3 Ventures	40	16.5
			4 or more	36	14.9
Experience as entrepreneur in years	7.72	8.03		242	
Employees			1 Employee	40	16.5
			2 Employees	43	17.8
			3-5 Employees	82	33.9
			6-10 Employees	39	16.1
			11-49 Employees	28	11.6
			50-249 Employees	9	3.7
			250 or more	1	0.4
Industry			Primary and Secondary	94	38.8
			Tertiary	148	61.2
Primary goal of the ventures			Profit and Growth	167	69
			To sustain myself	39	16.1
			Non-profit and socially responsible objectives	29	12
			Passion	7	2.9

of me (Carleton et al., 2007). Both inhibitory anxiety and prospective anxiety are scored via corresponding sum scores. The total sum score ranging between 1 and 5 indicates whether a person has a low or high intolerance of uncertainty. Extant research is not unequivocal if the

IUS-12 scale is multidimensional or unidimensional (McEvoy, Hyett, Shihata, Price, & Strachan, 2019). Therefore, this research has assessed the influence of both subscales as well as the construct as a whole. In the Dutch sample Helsen et al. (2013) validated translation of

the same 12-item scale was used to maintain reliability and validity. Although the IUS-12 is not undisputed as measure for IU, Roma and Hope (2017) have shown that it produced a better fit than the original 27-item scale.

The decision-making behaviour of the entrepreneur is the dependent variable. Whether an entrepreneur employs causal or effectual decision-making logics is measured using Alsos, Clausen and Solvoll (2014) 10-item scale (appendix A). The first five questions are aimed at the principles of causation where the second set of five questions focusses on the effectual principles. Answers are based on a 7 point Likert scale ranging from 1: totally disagree to 7: totally agree.

4.3 METHOD OF ANALYSIS

The data gathered via the questionnaires was analysed and tested in IBM SPSS Statistics version 26. The concepts of intolerance of uncertainty and effectuation and causation are scored using Likert scales. Although Likert scales are ordinal they can be used for parametric statistics (Norman, 2010). The reliability of these scales is determined based on Cronbach's Alpha. The measure ranges between 0 and 1 where 0.6 and 0.7 are the lower bounds of qualification (Henseler, Hubona, & Ray, 2016).

4.3.1 Exploratory factor analysis

This research employs exploratory factor analysis (EFA) for both constructs that are used. The purpose of EFA is "to ascertain the most

parsimonious number of interpretable factors required to explain the correlations among the observed variables, with or without underlying theoretical process in mind (...) it can be used to inform and generate or develop theory." (Reio & Shuck, 2015 p.13). In the context of this study there are is theory available on the factors that possible exist in the data since the previously validated instruments of Alsos et al., (2014) and Carleton et al., (2007) are used. Confirmatory factor analysis (CFA) is not used in this research as no hypotheses are drawn up regarding the underlying dimensions of the gathered data; an important part of CFA (Yong & Pearce, 2013).

In order to perform a EFA, the assumption should be met that there are sufficient correlations among the used variables. Bartlett's test of sphericity is used for this and should have a significance of $<.05$ to be able to proceed (Hair, Black, Babin, & Anderson, 2010). Another instrument is the Kaiser-Meyer-Olkin measure which scores should be between 0.5 and 1.0. The final measure is the measurement sampling adequacy (MSA), values for the entire table and each individual variable should exceed 0.5 for factor analysis to be appropriate (Hair et al., 2010). Since the aim is to reaffirm existing factors, principal axis factoring is applied with Oblimin rotation (Hair et al., 2010). The Oblimin rotation method is applied as it is expected that the factors are correlated with one another for both intolerance of uncertainty (e.g. McEvoy & Mahoney, 2011) and effectuation

(e.g. Alsos et al., 2014) and it yields better results than the Promax method, both of which are oblique rotation methods and available in SPSS version 26 (Dien, 2010). Cut-off values are extensively used in factor analyses regarding the factor loadings, however their use is subjected to controversy (Schmitt, 2011). Indeed, within extant literature the use and height of the cut-off point are subject of fierce debate (Heene, Hilbert, Draxler, Ziegler, & Bühner, 2011). Within EFA literature, rotated factor loading cut-off points between 0.3 and 0.6 are recommended (Hair et al., 2010; Swisher, Beckstead, & Bebeau, 2004; Yong & Pearce, 2013). Following Swisher et al., (2004) and Yong and Pearce (2013) a cut-off point of 0.3 is used.

4.3.2 Multiple Regression and its assumptions

The first set of hypotheses concern both metric criterion and predictor variables, therefore, multiple regression is used. Hierarchical regression is used to account for the control variables while including the predictor variables. In order to “provide a more balanced perspective” (Hair et al., 2010 p.187) the multiple regression is repeated using the stepwise method. Stepwise regression is a combination of forward selection and backward elimination techniques, as a result it creates a model that contains the optimal predictor variables (Liao, Li, Yang, Zhang, & Li, 2008). Stepwise regression has received criticisms in extant research, but the technique is useful for predictive, exploratory

research (Petrocelli, 2003). Moreover, the stepwise method is used in conjunction with the hierarchical regression as a means to confirm the initially produced results.

The hypothesized interaction effect is included in the multiple regression analysis. The dataset used in this study contains two genders (none of the respondents identified as ‘other’ and thus two groups remain, i.e. male/female). As a result, an interaction term was constructed. It uses the female gender as dummy variable and is multiplied with the intolerance of uncertainty sum score.

Multiple regression analysis has several assumptions regarding the dataset. The first assumption is that the data is normal distributed (Osborne & Waters, 2002). The most common technique to test this is the Shapiro-Wilk test, although more fitting smaller samples ($N < 50$) it has greater power compared to other tests when sample size increases (Razali & Wah, 2011). If the Shapiro-Wilk test is significant (i.e. $p < 0.05$) it cannot be assumed that the data is normally distributed (Ghasemi & Zahediasl, 2012). The impact of non-normal distributed data strongly diminishes when the sample size consists of more than 200 cases due to the central limit theorem (Ghasemi & Zahediasl, 2012; Hair et al., 2010). If the non-normal distributed data has kurtosis and skewness between -1 and 1 it can still be used without a need to change it (Blanca, Alarcón, Arnau, Bono, & Bendayan, 2017). The second assumption is that the variance of the dependent variables is equal across

multiple independent variables, this is often referred to as homoscedasticity in relation to multiple regression (Osborne & Waters, 2002). When assessing the homoscedasticity between two metric variables, scatterplots are often used. The third assumption is the normal distribution of the error terms, however, regression with larger samples are relatively robust to violation of this assumption (Williams, Grajales, & Kurkiewicz, 2013). The fourth assumption is the linearity of correlations which is assessed via the residual plots (Hair et al., 2010). The fifth and final assumption is that the independent variables are not correlated with each other, this is tested via the Variance Inflation Factor (VIF). This assumption is met when the VIF is <5 , yet other argue that VIF values below 10 also are acceptable (Craney & Surlis, 2002).

4.3.2 MANCOVA and its assumptions

The second set of hypotheses explores the possible relations between gender, intolerance of uncertainty and its sub-constructs inhibitory anxiety and prospective anxiety. Here the independent variables (or factors) are categorical whereas the dependent variables are metric. The t -test tests if there is a difference between the groups and the effect of a group on the dependent variables when there are no more than two groups (Hair et al., 2010). This research uses multiple dependent variables (intolerance of uncertainty, inhibitory anxiety and prospective anxiety) this could be tested via three separate t -tests. However, performing

multiple t -tests would lead to “probability pyramiding” thus this research uses the multivariate analysis of variance as it does not suffer from this problem (Huberty & Morris, 1989 p.306). In fact, as there are just two groups (male/female), this research uses a special variation of the MANOVA, the Hotelling’s T^2 (Hair et al., 2010). Moreover, the possible relation between the constructs is controlled for via multiple variables, the inclusion of these covariates leads to the use of the MANCOVA (Hair et al., 2010). Within MANCOVA, control variables are commonly referred to as covariates even if they are not metric (Atinc, Simmering, & Kroll, 2012).

This research uses both Hotelling’s T^2 as well as Wilks’ Λ to identify the differences between the groups (Todorov & Filzmoser, 2010). Although multiple tests are available, one is not necessarily better than another as they all rely on the same assumptions (O’Brien & Kaiser, 1985) and Wilks’ Λ is considered the most popular and widely used test (Grice & Iwasaki, 2009).

Significant results were subjected to further analyses to better understand the differences between the groups and how they affect the dependent variables. These relations are assessed based on the η^2 since the ω^2 is not present in the used statistics programme. The η^2 is only assessed for groups that differ significantly from one another (Hair et al., 2010).

The statistical technique of MANCOVA implies several assumptions regarding the design

of the study and the dataset. Regarding the research design: The sample size per group has to exceed the amount of dependent variables, each group should consist of at least 20 observations and the groups should have approximately similar sizes (Hair et al., 2010).

The assumptions made on the data are the independence of the observations, equal variance-covariance matrices across the groups and the dependent variables should have a multivariate normal distribution (Hair et al., 2010). The first criterion is assumed to be met since the data is gathered via online individual surveys. The equality of the variance-covariance matrices of the groups is tested via Box's M test, nonsignificant differences between the groups means that the matrices are assumed to be equal (i.e. the desired result is $p > 0.05$) (Hair et al., 2010). The similarity of the variance-covariance matrices for the dependent variables is tested via Levene's test, interpretation is similar to Box's M test (Hair et al., 2010). Both, the Box's M test, as well as Levene's test, can be too sensitive to the extent that it detects heterogeneity so small that it does not affect the MANCOVA (Olson, 1974), however, as the results show the tests are all above the $p > 0.05$ threshold. The final assumption is multivariate normality and an absence of outliers, multivariate normality is assumed when univariate normality is present at all variables (Hair et al., 2010), the univariate normality of the variables is tested as described in the section on multiple regression, outliers are assessed via Boxplots

(Schwertman, Owens, & Adnan, 2004). Although boxplot normally use multipliers of 1.5, this research employs multipliers of 2.2 following Hoaglin and Iglewicz (1987) as the boundary of 1.5IQR can be too sensitive towards outliers (Schwertman et al., 2004). The MANCOVA is repeated with 90% of the sample that is randomly selected by the analysis software to further validate the results initially found following Hair et al. (2010) who claims: "replication as the primary means of validation" (p.701) regarding MANCOVA.

4.4 CONTROL VARIABLES

This research includes multiple control variables. The first is the nationality of the entrepreneur making a distinction between Dutch and South African origin. The second is degree, indeed, the causal approach is often associated with MBA-degrees (Sarasvathy, 2001) controlling for degree obtained allows to identify whether or not this has an influence on the decision-making behaviour in this sample. Consequently, study background is likewise included as control variable. The fourth control variable is experience of the entrepreneur in years. The number of employees is the fifth control variable. The sixth control variable is the type of industry in which the entrepreneur is active. The last control variable is the primary objective of the venture.

V. RESULTS

The reliability of the scales used in this research were assessed using Cronbach's α (appendix B). The measurement scale for causal decision-making failed to meet the minimum lower bound ($\alpha = 0.577$). The scales for effectuation ($\alpha = 0.798$), prospective anxiety ($\alpha = 0.806$) inhibitory anxiety ($\alpha = 0.857$) and intolerance of uncertainty as a whole ($\alpha = 0.877$) proved to be reliable. The scale used for causation would meet the minimum bound of 0.6 when question three would be omitted ($\alpha = 0.636$). However, since each question corresponds with one principal of causation and the scale has been proven reliable by Alsos et al. (2014) it will not be omitted at this stage.

5.1 EXPLORATORY FACTOR ANALYSIS

5.1.1 Assumptions

Both scales of effectuation/causation and intolerance of uncertainty are suitable for factor analysis. The intolerance of uncertainty scale met all three criteria, the KMO score (KMO=0.888), Bartlett's test of sphericity ($\chi^2(66)=1175.684$, $p < .001$) and the MSA exceeded the threshold of 0.5. The results of the effectuation/causation scale likewise showed that CFA can be executed, the KMO score (KMO=0.751), Bartlett's test ($\chi^2(45)=545.145$, $p < .001$) and MSA (all exceeded 0.5) all met the required assumptions. The corresponding tables are presented in appendix C.

5.1.2 Findings

The factor analysis of the intolerance of uncertainty scale indicates two factors, as expected based on research from Carleton et al. (2007) and Helsen et al. (2013). The unrotated factor matrix shows that the majority of the questions load high on one or the other factor. Oblique rotation was applied as it was expected that the factors would be correlated, as other researchers expected as well (Carleton et al., 2007). The rotated pattern matrix shows a similar pattern, however, question 1 loads lower than before and relatively similar on both factors. Nevertheless, the EFA confirmed the two factors as found by Carleton et al. (2007), shown in appendix D meeting the cut-off threshold of 0.3. As a result, the questions that load high on a factor are used as summated scales in the remainder of this research.

The EFA of the effectuation/causation scale yielded two factors. Although based on the eigenvalues three factors could be extracted as well. The aim was to confirm the findings of Alsos et al. (2014) and thus two factor were applied. However, both in the unrotated factor matrix as well as the rotated pattern matrix, question 3 loads below the cut-off value for either factor (.077 and .132 respectively). Oblique rotation was applied here as well as it was expected that the concepts of causation and effectuation would be correlated to one another (appendix D). Question three's failure to meet the cut-off threshold of 0.3 persists after the rotation.

Although the scales used to measure decision-making behaviour are based on extant research, this research uses two different variants of the causation scale. Indeed, removing question 3 would increase Cronbach's alpha past the minimum threshold of 0.6. Moreover, the question loads below the cut-off value for either factor. Since the five questions per factor relate to a specific part of the causal perspective, omitting one question changes the meaning of the factor, as both causation and effectuation are formative constructs (Chandler et al., 2011), as well as influence the results. Therefore, this research uses two causation scales, one which includes question 3 and which omits this question. This approach allows for comparison between the two different scales and assess its inclusion or exclusion on the subsequent results. Also, if the question is not excluded this research is better comparable to prior research that employs Alsos et al. (2014) scale. The EFA without question 3 is shown in appendix D.

The exploratory factor analysis was attempted for just the Dutch sample to assess the translated scales. However, due to the limited

size of the sample a factor analysis could not be completed.

Based on the EFA the descriptive statistics of both factors is shown in table 3. Based on the factor analysis, the table shows that in general the entrepreneurs score higher on prospective anxiety than inhibitory anxiety. With a mean of 2.56 the sample scores on average in the middle of the scale. The entrepreneurs in this sample appear to favour causation with a higher mean and lower standard deviation. The summated score of causation where the third question is omitted shows both a higher mean and standard deviation than the factor that includes the question.

5.2 DATA ANALYSIS

5.2.1 Multiple regression assumptions

The normal distribution of the data can be assumed based on the Shapiro-Wilk test for the prospective anxiety scale ($W(242) = .991$ $\rho = .147$). However, based on this test, normal distribution cannot be assumed for inhibitory anxiety ($W(242) = .905$ $\rho < .001$), of intolerance of uncertainty ($W(242) = .979$ $\rho = .001$), effectuation ($W(242) = .985$ $\rho = .010$),

Table 3
Descriptive statistics factors

Construct	Minimum	Maximum	Mean	Standard Deviation
Prospective Anxiety	1	5	2.95	.77
Inhibitory Anxiety	1	5	2.02	.91
Intolerance of Uncertainty	1	4.67	2.56	.74
Effectuation	1	7	3.87	1.39
Causation	2	7	5.03	.92
Causation (<i>question 3 omitted</i>)	1	7	5.35	1.00

Table 4
Correlation table

	Mean	Std. Dev.	1	2	3	4	5	6	7	8	9	10	11
1 Prospective anxiety	2.95	.77											
2 Inhibitory anxiety	2.02	.91	.60**										
3 Intolerance of Uncertainty	2.56	.74	.91**	.87**									
4 Effectuation	3.87	1.39	.04	.20**	.12								
5 Causation	5.03	.92	.18**	.05	.13*	-.26**							
6 Causation question 3 omitted	5.35	1.00	.21**	.07	.16*	-.25**	.93**						
7 Gender	.24	.43	.10	.04	.08	.15*	-.07	-.04					
8 Nationality	.25	.54	-.01	.04	.01	.08	-.15*	-.16*	.03				
9 Degree	3.20	1.37	-.21**	-.17**	-.22**	-.13*	.10	.10	-.08	.16*			
10 Study	.71	.46	.17**	.19**	.2**	.05	-.01	-.003	.18**	.11	-.13*		
11 Number of employees	3.01	1.37	-.02	-.15*	-.09	-.27**	.24**	.20	-.12	-.12	.12	.01	
12 Objective	1.49	.82	-.11	.04	-.04	.21**	-.28**	-.31**	.15*	.39**	-.01	-.004	-.14*

N = 242
 * Correlation is significant at .05, two tailed
 ** Correlation is significant at .01, two tailed
 Gender: 0 = Male, 1 = Female, 2 = Other
 Nationality: 0 = South African, 1 = Other, 2 = Dutch
 Degree: 1 = High School, 2 = Community College, 3 = Bachelor's Degree, 4 = Honours Degree, 5 = Master's Degree, 6 = Doctorate Degree
 Study: 0 = Technical, 1 = Non-technical
 Number of employees: 1 = 1, 2 = 2, 3 = 3-5, 4 = 6-10, 5 = 11-49, 6 = 50-249, 7 >= 250
 Objective: 1 = Profit and Growth, 2 = To sustain myself, 3 = Non-profit, 4 = Passion

causation ($W(242) = .980$ $\rho = .002$) and the adjusted causation scale ($W(242) = .957$ $\rho < .001$). All scales bar the adjusted causation scale (kurtosis = 1.064) do not exceed the minimum and maximum kurtosis and skewness of one and minus one (appendix E) (Blanca et al., 2017). Due to the sample size, the impact of non-normality of the adjusted causation scale is expected to be restricted based on the central limit theorem (Ghasemi & Zahediasl, 2012; Hair et al., 2010).

The homoscedasticity and normal distribution of the error terms can be assumed for all

variables involved based on the scatterplots shown in appendix E. Moreover, the linearity of the correlations can be assumed between the dependent and independent variables (appendix E). The VIF does not exceed 10 for the independent variables.

5.2.2 MANCOVA assumptions

The independence of the observations is assumed due to the method of data gathering. The variance-covariance matrixes were similar in both the groups (gender) based on the Box-M test ($F(3,186071) = 1.453$, $\rho = 0.698$) and dependent variables; prospective anxiety

($F(1,240) = .18$, $p = .894$), inhibitory anxiety ($F(1,240) = .021$, $p = .885$) and intolerance of uncertainty ($F(1,240) = .092$, $p = .762$) based on Levene's test.

Multivariate normality is based on the univariate normality of the variables. The univariate normality has been assessed already for inhibitory, prospective anxiety and intolerance of uncertainty in relation to the multiple regression. As the univariate assumption there is met, the multivariate normality is assumed here as well.

The boxplots show no outliers for prospective anxiety, inhibitory anxiety and intolerance of uncertainty when the multipliers are adjusted to 2.2 instead of 1.5 following Hoaglin and Iglewicz (1987) (appendix F).

5.3 HYPOTHESES TESTING

Based on the correlation matrix (table 4), control variables that did not correlate with intolerance of uncertainty, inhibitory anxiety, prospective anxiety, causation or effectuation are excluded. As a result, only the variables gender, nationality, degree, study, number of employees and objective are retained as control variables.

In the first hierarchical regression, causation is the dependent variable. First, the control variables were added (model 1 and 4). Then, the predictor variables intolerance of uncertainty (model 2), the interaction term (model 3) and prospective- and inhibitory anxiety were added (model 5). The results are shown in table 5.

Intolerance of uncertainty has a positive significant relationship with the causation perspective ($\beta = .15$, $p < .01$), confirming hypothesis 1_a. The relationship between inhibitory anxiety and causation is not significant ($\beta = .15$, $p > .05$), rejecting hypothesis 1_b. Hypothesis 1_c on the other hand can be confirmed as the relation between prospective anxiety and causation is positive and significant ($\beta = .22$, $p < .05$). These results were consistent in the adjusted causation scale that omits question 3. However, there was a difference in either or both the strength of the β as well as the p for the predictor variables. As is shown in the correlation between intolerance of uncertainty ($\beta = .27$, $p < .01$), inhibitory anxiety ($\beta = .00$, $p > .05$) and prospective anxiety ($\beta = .28$, $p < .01$) and the adjusted causation scale (appendix F). The second hierarchical regression consists of the same independent variables but has effectuation as the dependent variable (table 5). The negative relation between intolerance of uncertainty and effectuation was not found ($\beta = .16$, $p > .05$), thus hypothesis 1_d is rejected. Hypothesis 1_e is likewise rejected since a positive correlation was found between inhibitory anxiety and effectuation ($\beta = .30$, $p < .05$). Lastly, hypothesis 1_f is rejected as no negative relation was found between prospective anxiety and effectuation ($\beta = .17$, $p > .05$).

Table 5
Results hierarchical regression

Dependent Variable: Causation										
Variable	Model 1		Model 2		Model 3		Model 4		Model 5	
	β	SE	β	SE	β	SE	β	SE	β	SE
Constant	4.87**	.24	4.26**	.33	4.39**	.34	4.87**	.24	4.13**	.34
Gender	-.01	.13	-.02	.13	-.67	.48	-.01	.13	-.04	.13
Nationality	-.08	.12	-.09	.12	-.09	.12	-.08	.12	-.10	.12
Degree	.06	.04	.08	.04	.08	.04	.06	.04	.08	.04
Study	.002	.13	-.05	.13	-.05	.13	.002	.13	-.04	.13
Number of Employees	.13**	.04	.14**	.04	.14**	.04	.13**	.04	.13**	.04
Objective Intolerance of uncertainty	-.26**	.08	-.244**	.08	-.24**	.08	-.26**	.08	-.23**	.08
<i>Intolerance of uncertainty x Female gender</i>			.211**	.08	.15	.09				
Inhibitory Anxiety									.00	.08
Prospective Anxiety									.22*	.09
Adjusted R ²	.103		.127		.130		.103		.129	
F	5.607**		5.994**		5.512**		5.607**		5.447**	
Change R ²			.027		.007				.032	
Change F			7.398**		1.968				4.469*	
Dependent Variable: Effectuation										
Variable	Model 1		Model 2		Model 3		Model 4		Model 5	
	β	SE	β	SE	β	SE	β	SE	β	SE
Constant	4.35**	.37	3.89**	.50	3.91**	.53	4.35**	.37	4.22**	.52
Gender	.30	.20	.29	.20	.2	.74	.30	.20	.34	.20
Nationality	.01	.18	.004	.18	.004	.18	.01	.18	.03	.18
Degree	-.10	.06	-.08	.07	-.08	.07	-.10	.06	-.09	.07
Study	.06	.19	.02	.20	.02	.2	.06	.19	-.01	.19
Number of Employees	-.23**	.06	-.22**	.06	-.22**	.06	-.23**	.06	-.20**	.06
Objective Intolerance of uncertainty	.27*	.12	.28*	.12	.28*	.12	.27*	.12	.24*	.14
<i>Intolerance of uncertainty x Female gender</i>			.16	.12	.15	.14				
Inhibitory Anxiety									.30*	.12
Prospective Anxiety									.17	.14
Adjusted R ²	.099		.102		.099		.099		.116	
F	5.425**		4.926**		4.295**		5.425**		4.968**	
Change R ²			.007		.000				.024	
Change F			1.824		1.952				3.281*	

N=242

Unstandardized β coefficients are reported

Method: Enter

* Correlation is significant at $p < .05$, two tailed

** Correlation is significant at $p < .01$, two tailed

The multivariate analysis of covariance (table 6) showed no significant differences between the genders regarding the inhibitory anxiety, prospective anxiety or intolerance of uncertainty of the entrepreneur ($\Lambda = .985$ $F(2,222) = 1.642$, $\rho = .196$) and ($T^2 = 3.615$, $\rho = .196$). The differences between gender therefore do not have to be scrutinized further per dependent variable. As a result, hypothesis 2_a through 2_f can be rejected.

The final hypothesis supposes an interaction effect of gender on the correlation between intolerance of uncertainty and causation / effectuation. Both presumed interaction proved to be insignificant as gender neither moderates the relationship between intolerance of uncertainty and causation ($\beta = .24$ $\rho > .05$) as the relationship between intolerance of uncertainty and effectuation ($\beta = .04$ $\rho > .05$) (table 5). This result was similar in the adjusted causation scale ($\beta = .25$ $\rho > .05$) (appendix G). As a result, hypothesis 3 is rejected.

5.4 CONTROL VARIABLES

As stated in the methods section, this research used several control variables. In the hierarchical regression the number of employees

was significant across all models for both causation ($\beta = .13$ $\rho < .01$) as well as effectuation ($\beta = -.23$ $\rho < .01$). The objective of the firm significantly effects causation ($\beta = -.26$ $\rho < .01$) and effectuation ($\beta = .27$ $\rho < .05$). The other control variables gender, nationality, degree and study proved to be insignificant.

In the MANCOVA, Wilks' Λ shows that: study ($\Lambda = .962$ $F(2,222) = 4.416$, $\rho < .05$), ($T^2 = 9.64$, $\rho = .013$) and objective ($\Lambda = .945$ $F(6,444) = 2.123$, $\rho = .05$) have significant differences within these groups on the dependent variables (intolerance of uncertainty, prospective anxiety and inhibitory anxiety). Further analysis shows that the differences for degree apply to prospective anxiety ($F(5,223) = 2.346$, $\rho = .05$) and intolerance of uncertainty ($F(5,223) = 2.495$, $\rho < .05$) but not inhibitory anxiety ($F(5,223) = 1.844$, $\rho > .05$). With regard to objective, the effect is only significant for prospective anxiety ($F(3,223) = 2.905$, $\rho < .05$) and not for intolerance of uncertainty nor inhibitory anxiety. The results are summarised in table 7.

Table 6
Results MANCOVA

Dependent Variables: Intolerance of uncertainty, prospective anxiety and inhibitory anxiety					
Independent Variable	Wilks' Λ	Hotelling's T^2	F	Sig.	Power
Nationality	.989	> 2 groups	.624	.646	.205
Degree	.933	> 2 groups	1.562	.115	.770
Study	.962	9.64	4.416	.013	.756
Number of Employees	.95	> 2 groups	.970	.477	.572
Objective	.945	> 2 groups	5.123	.05	.761
Gender	.985	3.615	1.642	.196	.344

5.5 RESULT VALIDATION

To validate the results, the hierarchical regressions used to test the first and third hypotheses are repeated utilizing the stepwise method. The results of the stepwise regression mirror the hierarchical regression, in fact, it paints a clearer picture. For causation, the final model ($F(3,238)=12.982$ $R^2 = .13$ $\rho < .01$) included objective ($\beta = -.259$ $\rho < .01$), number of employees ($\beta = .14$ $\rho < .01$) and prospective anxiety ($\beta = .182$ $\rho < .05$). When the third question is omitted from the causation scale the regression yields four models which are slightly different. Indeed, objective ($\beta = -.33$ $\rho < .01$), prospective anxiety ($\beta = .27$ $\rho < .01$), number of employees ($\beta = .11$ $\rho < .05$) and degree ($\beta = .09$ $\rho < .05$) are retained in the final model ($F(4,237)=12.248$ $R^2 = .157$ $\rho < .01$). Regarding effectuation, number of employees ($\beta = -.23$ ρ

$< .01$), objective ($\beta = .28$ $\rho < .01$) and inhibitory anxiety ($\beta = .24$ $\rho < .01$) are the independent variables in the ultimate model ($F(3,238)=11.371$ $R^2 = .114$ $\rho < .01$). All other variables, including the interaction effect, are excluded (appendix H).

The MANCOVA is repeated with 90% of the sample which was randomly selected by the analysis software. The differences between the genders remain insignificant ($\Lambda = .994$ $F(2,199) = .554$, $\rho > .05$) whereas the control variables study ($\Lambda = .967$ $F(2,199) = 3.353$, $\rho < .05$) and objective ($\Lambda = .924$ $F(6,398) = 2.682$, $\rho < .05$) persist as significant.

Table 7
Overview of results

Hypothesis	Independent	Dependent	Effect	ρ	β	Result
1A	Intolerance of Uncertainty	Causation	↑	<.01	.211	Accepted
1B	Inhibitory Anxiety	Causation	↑	>.05	.00	Rejected
1C	Prospective Anxiety	Causation	↑	<.05	.22	Accepted
1D	Intolerance of Uncertainty	Effectuation	↓	>.05	.16	Rejected
1E	Inhibitory Anxiety	Effectuation	↓	<.05	.30	Rejected
1F	Prospective Anxiety	Effectuation	↓	>.05	.17	Rejected
2A	Gender (F)	Intolerance of Uncertainty	↑	>.05	$\Lambda=.985$	Rejected
2B	Gender (F)	Inhibitory Anxiety	↑	>.05	$\Lambda=.985$	Rejected
2C	Gender (F)	Prospective Anxiety	↑	>.05	$\Lambda=.985$	Rejected
2D	Gender (M)	Intolerance of Uncertainty	↓	>.05	$\Lambda=.985$	Rejected
2E	Gender (M)	Inhibitory Anxiety	↓	>.05	$\Lambda=.985$	Rejected
2F	Gender (M)	Prospective Anxiety	↓	>.05	$\Lambda=.985$	Rejected
3	Gender * Intolerance of Uncertainty	Causation	↑	>.05	.24	Rejected
3	Gender * Intolerance of Uncertainty	Effectuation	↑	>.05	.04	Rejected

VI. DISCUSSION

The presence of uncertainty is central to effectuation theory (Brettel et al., 2012). Indeed, an important difference between effectual and causal decision-making is the entrepreneur's approach to dealing with uncertainty (Wiltbank et al., 2006). The causal entrepreneur faces uncertainty through prediction whereas the effectual entrepreneur aims for control (Karami et al., 2019). This study examined the influence of the entrepreneur's intolerance of uncertainty on his decision-making. In doing so, possible personal-level antecedents are explored to fill the gap in current effectuation literature (Arend et al., 2015; Grégoire & Cherchem, 2020). Based on quantitative research, this study has yielded several results.

First, the hypothesized positive relationship between intolerance of uncertainty and causation was confirmed. This findings shows that the intolerance of uncertainty scale is applicable to non-clinical subjects as stated by Dugas et al. (2004). Moreover, it demonstrates that intolerance of uncertainty does influence behaviour in nonclinical samples, in line with the findings of Thibodeau et al. (2013). A more surprising result is the positive and statistically significant correlation between inhibitory anxiety and effectuation.

However, upon on closer inspection, the divergent influences of prospective anxiety and inhibitory anxiety are not surprising per se. Prospective intolerance of uncertainty concerns anxiety related to future events (Carleton et al.,

2007). Individuals who score high on this dimension have an increased need for predictability and seek information to minimize the uncertainty (Hale et al., 2016; Hong & Lee, 2015). The significant positive correlation with the causation perspective therefore seems hardly surprising. Inhibitory intolerance of uncertainty is anxiety that leads to inaction or even paralysis when facing anxiety (Hill & Hamm, 2019; McEvoy & Mahoney, 2012). On the surface it is surprising that it significantly and positively correlates with the effectuation perspective; decision-making that centres around action (Grégoire & Cherchem, 2020). Yet, closer inspection of the questions used to assess the effectuation perspective might provide insight to this result.

Indeed, the effectuation perspective can be described as embracing uncertainty and active agentic behaviour of the entrepreneur (Grégoire & Cherchem, 2020). However, based on the questions used in the questionnaire, the effectuation perspective can also be reframed. For example question 10 focusses on the control aspect of effectuation (Alsos et al., 2014 p.39). This question matches the pilot-in-the-plane principle (Sarasvathy, 2008), yet, it could also point towards an inability or unwillingness to make a (long-term) decision when faced with uncertainty, fitting high inhibitory anxiety. Question eight could be reframed likewise; its focus is on dealing with contingencies (Alsos et al., 2014 p.39). Based on the lemonade principle (Sarasvathy, 2008), this question could indicate an acceptance to an ever changing future

in which planning is not useful. On the other hand, it could also point to an entrepreneur's inability to act or decide regarding the firm's future in the face of uncertainty. Indeed, high answers on both questions – and the corresponding behaviour – could be the result of repeated avoidance behaviour and only making decisions on the last possible moment, corresponding with high inhibitory anxiety (Hong & Lee, 2015). A similar argument could be used for question six which is aimed at how an entrepreneur uses the means he has available (Alsos et al., 2014 p.39). This question is focussed on the bird-in-hand principle, rather than trying to predict an uncertain future, the entrepreneur focusses on what is within his control (Sarasvathy, 2001). Conversely, this could indicate a high inhibitory anxiety; to avoid the paralysis caused by high uncertainty or the uncertainty altogether, the entrepreneur opts to only use what is within his direct control rather than planning and working ahead in an uncertain future (Hale et al., 2016). When considering the effectuation questions from a different perspective, similarities arise with under-engagement. Under-engagement are "(...) behaviours, referring to actions aimed to avoid future uncertain situations (e.g., distracting); impulsivity, consisting in the performance of behaviours to immediately eliminate uncertainty or its associated distress (e.g., making impulsive decisions)" (Bottesi, Carraro, Martignon, Cerea, & Ghisi, 2019 p.56). Bottesi et al. (2019) found that inhibitory anxiety is a significant and

positive predictor of under-engagement behaviours.

Regardless, these findings show that uncertainty is central to effectuation theory (Brettel et al., 2012). How an entrepreneur manages uncertainty (i.e. either an effectual or causal approach) seems to be influenced by the entrepreneur's predisposition on how to react when confronted with the possible existence of uncertainty.

Second, no difference was found between the genders regarding intolerance of uncertainty, inhibitory anxiety or prospective anxiety. As a result, this study could not replicate the results of Brighetti and Lucarelli (2015) that found that women do tend to assess themselves according to the prevailing stereotypes, nor the results of Doruk et al. (2015) who found that female students score higher on the intolerance of uncertainty scale than male students. This result can partly be explained by the difference of sample sizes between men (75.6%) and women (24.4%). Yet, this finding is in accordance with other research on gender and intolerance of uncertainty that failed to find a relationship (e.g. Buhr & Dugas, 2002; Robichaud et al., 2003; Strout et al., 2018).

Third, the proposed interaction effect of gender on intolerance of uncertainty and effectuation/causation proved to be insignificant. This indicates there is no moderation effect of gender on the relationship between intolerance of uncertainty and effectuation/causation. The lack of correlation between gender and intolerance of uncertainty, the fact that intolerance of

uncertainty and effectuation do not have a statistically significant relation and the uneven group sizes regarding the genders can be possible reasons for this result. This result is in contrast with the findings of Bezerra de Melo et al. (2019) and, Frigotto and Della Valle (2018) who have found that gender does influence entrepreneurial decision-making.

Lastly, the research used two causation scales since the third question of this perspective was neither reliable (Cronbach's α) nor internally consistent (factor analysis) (Sijtsma, 2009b, 2009a). This means that the question in its current form does not sufficiently capture the lemonade principle from a causal perspective. Indeed, the question focusses on pre-existing knowledge, this targets Sarasvathy's (2008) lemonade principle, i.e. the leveraging of contingencies. Although effectuation is the inverse of causation, both approaches are not mutually exclusive (Reymen et al., 2015). The current phrasing of the question is opposite of the effectual perspective but is not necessarily fitting the causal perspective. Sarasvathy, (2008) describes the lemonade principle from the causal perspective as: "Causal models almost always seek either to avoid the unexpected or to achieve predetermined goals *in spite of* contingencies" (p.89). The distinction between the effectual and causal entrepreneur is "on exploitation of contingencies rather than exploitation of pre-existing knowledge" (Alsos et al., 2014 p.6). However, the question corresponding question as formulated by Alsos et al., (2014 p.39) does not appear to fully cover

this meaning. Moreover, considering short-term opportunities is not only beholden to the effectuation perspective per se. Indeed, the causal entrepreneur is able to seize short-term opportunities while using his pre-existing knowledge. Certainly, it is difficult to plan or predict opportunities that arise suddenly, however, that does not mean that such opportunities are outside the scope of the business plan and thus cannot be capitalized on by the causal entrepreneur.

Both effectuation and causation are formative constructs (Chandler et al., 2011) thus omitting question three alters the meaning of the causation construct. Based on the remaining principles (bird-in-hand, crazy-quilt, affordable loss & pilot-in-the-plane) the causal entrepreneur could be described as: *an entrepreneur who selects means to create a given effect which is based on competitive analysis as to predict the uncertain future with the aim of maximizing the possible returns* (based on (Sarasvathy, 2001, 2008). However, altering the meaning of causation would mean that it is no longer comparable to other research that utilizes a different definition. This makes it difficult to generalize the findings of the adjusted scale to research that uses the complete scale.

Regarding the results, the adjusted scale did not differ strongly from the original scale albeit that the results were stronger. Indeed, the predictive β of intolerance of uncertainty was higher (.27) for the adjusted scale than the original scale (.211) while being equal in significance. This result was similar for prospective

anxiety. These findings further strengthen the assumption that the third question is not consistent with the other causation questions since the correlations became greater when it was omitted. In other words, the third question had a negative impact on the height of the β of the predictor variables regarding significant relations.

6.2 THEORETICAL CONTRIBUTIONS

Due to the concepts used in this research, it adds to the literature in several streams.

With regards of effectuation literature, prospective anxiety and inhibitory anxiety are personal-level antecedents of causal and effectual decision-making respectively. As a result, this research responds to this gap in current effectuation literature (Arend et al., 2015; Engel et al., 2014; Grégoire & Cherchem, 2020; Reymen et al., 2015). Moreover, this study successfully connects the theory of effectuation with previously established constructs: intolerance of uncertainty (Perry et al., 2012). Furthermore, this study failed to find a interaction effect of gender on the relation between intolerance of uncertainty and effectuation, thereby contributing to previous research on the effect of gender on effectual decision-making (Bezerra de Melo et al., 2019; Frigotto & Della Valle, 2018). Lastly, this research uses the questionnaire developed by Alsos et al. (2014) and thereby contributes to the validity of these scales.

Although effectuation was the focal point of this research, it nevertheless contributes to intolerance of uncertainty literature. Indeed, in

line with Dugas et al. (2004) and Angehrn et al. (2020) this research shows that the IU scale is applicable to non-clinical samples. Furthermore, it proves that the concept is applicable to entrepreneurship research. Since intolerance of uncertainty, inhibitory anxiety and prospective anxiety significantly influence either causation or effectuation, this research adds to the understanding of how these concepts influence decision-making (Thibodeau et al., 2013). Moreover, due to the divergent effects between the sub-constructs, this research adds to the understanding that intolerance of uncertainty should not be approached as unidimensional construct but as multidimensional one (McEvoy et al., 2019). While failing to find a significant difference between the genders regarding IU and its sub-constructs for entrepreneurs, this research adds to current literature that is not unequivocal whether or not there are significant differences between the genders (Bottesi et al., 2018; Buhr & Dugas, 2002; Doruk et al., 2015; Hale et al., 2016; Robichaud et al., 2003; Roma & Hope, 2017; Strout et al., 2018).

6.3 PRACTICAL CONTRIBUTIONS

The results of this study also have practical implications. First of all, the data that is gathered for this research may be used to further understand the differences between entrepreneurs within and across countries. Secondly, the results of this research create a deeper understanding of personal-level antecedents of decision-making, these antecedents could be

used to alter or guide the behaviour of the entrepreneur. For example, through education and training. In doing so, entrepreneurs could be taught decision-making logics that are more beneficial to them, their firm and their region. This is particularly beneficial for impoverished regions/countries that stimulate entrepreneurship to combat poverty. Lastly, the results show that intolerance of uncertainty influences behaviour in nonclinical subjects and thus provides additional insights for practitioners how such concepts influence behaviour in such samples. This information could be used for example by coaches or psychologists who guide entrepreneurs.

6.4 LIMITATIONS

Although this study aimed to advance the current understanding of effectuation and its antecedents, the limitations of this study must be considered. The causation scale used, as developed by Alsos et al. (2014), did not meet the threshold value for Cronbach's α and question three loaded low on either factor. Nevertheless, the differences between the original and the adjusted scale were slight and minimally influenced the results. Secondly, the group sizes in the MANCOVA differed strongly in size. Yet, the used statistical software is able to account for this violation (Hair et al., 2010).

To validate the results of the hierarchical regression, stepwise methods were employed. Although suited to exploratory research and being used confirmatory and cautiously in this research, the method's limitations have to be

noted (see Petrocelli, 2003). However, as the results of both stepwise and hierarchical regression showed similar outcomes, the limitations of stepwise regression have had a minimal impact on the results.

The Dutch sample was significantly smaller than the South-African sample. The gathering of data in The Netherlands was hampered by the Covid-19 virus, the disparity in group sizes made it impossible to compare the results between the countries or to validate the translated scales used due to the sample being too small for EFA. Nonetheless, the gathered responses can be used and expanded in future research which will be able to make such comparisons.

Lastly, the current study design makes it possible to identify antecedents of decision-making logics. However, the design fails in explaining *why* these concepts are predictors of either decision-making logic, especially with regards to the unexpected effect of inhibitory anxiety on effectuation. Yet, the current design does fill a gap in current effectuation literature pointed out by several researchers (Arend et al., 2015; Grégoire & Cherchem, 2020). Moreover, a substantial amount of effectuation research is qualitative in nature, this research adds to quantitative effectuation research (Perry et al., 2012).

6.5 AVENUES FOR FUTURE RESEARCH

Both the results and the limitations of this research provide avenues for future research.

First of all, to gain clearer insight into why certain antecedents lead to or diminish the use of effectual decision-making logics future research may benefit from a design that incorporates both quantitative as well as qualitative techniques. For example a research design as used by Reymen et al. (2015).

Secondly, this research made use of data gathered in two different countries. Future research can be aimed at increasing the amount of data gathered in The Netherlands, and/or adding to the existing data set with information from different countries. This can serve two purposes. Firstly, more research with larger sample sizes can increase the reliability and robustness of the findings that inhibitory anxiety and prospective anxiety are antecedents of effectual or causal decision-making respectively. Secondly, roughly equal sample sizes from multiple countries make it possible to control for and/or investigate effects that are caused through geographical, economic, political, cultural differences between the countries.

Furthermore, other antecedents of effectuation can still be identified. This research showed that the variables: number of employees and objective significantly impact either causation or effectuation. In this research both variables were used as control variables but can be the focal point of future research that tries to identify more antecedents of effectuation. Indeed, the antecedents uncovered in this research can be part of a larger nomological network that has not been fully identified.

Third, a discriminatory factor between effectuation and causation are their respective worldviews. Indeed, the effectual perspective believes one is possible to create its own opportunities. Conversely, causal logics are based on the assumption that opportunities are to be discovered. As stated by Shane and Venkataraman (2000) in their seminal paper: “we define the field of entrepreneurship as the scholarly examination of how, by whom and with what effects opportunities to create future goods and services are *discovered, evaluated* and exploited [emphasis added]” (p.218). Which decision-making logic and entrepreneur employs may be the result of his belief if opportunities are created or discovered.

Lastly, this research used Alsos et al. (2014) scale to examine effectuation and causation. This instrument proved to be flawed with regards to the third question in the causation perspective. Future researchers could try to amend this if it persists in other samples. Furthermore, within extant literature multiple different scales are present, most notably the scale of Chandler et al. (2011). However, one agreed upon scale allows “(...) for “apples-to-apples” comparisons within and across cases, studies, tasks, and other contexts and circumstances” (Grégoire & Cherchem, 2020 p. 634).

VII. CONCLUSION

The aim of this research was to identify possible personal-level antecedents of effectual and causal decision-making. To structure this research, the following research questions

were drawn up and can be answered as follows:

1) To what extent is the entrepreneur's dominant decision-making logic influenced by his intolerance of uncertainty?

The effectual decision-making is positively and significantly affected by the inhibitory anxiety of the entrepreneur. Both prospective anxiety and intolerance of uncertainty are significantly related to causal decision-making. Based on the stepwise regression it can be concluded that prospective anxiety is a better predictor variable compared with intolerance of uncertainty. These findings consisted when controlling for gender, nationality, degree, study, number of employees and objective.

2) To what extent does the gender of the entrepreneur influence his self-assessment of intolerance of uncertainty?

Based on the MANCOVA no differences were found between the genders (male/female) regarding the intolerance of uncertainty, inhibitory anxiety and prospective anxiety.

3) To what extent does the gender of the entrepreneur moderate the relationship between intolerance of uncertainty and decision-making?

Based on both the hierarchical as well as the stepwise regression, no moderation effects of gender were found on the relation between intolerance of uncertainty and effectuation/causation.

This research demonstrates that prospective anxiety is a predictor variable of causal decision-making whereas inhibitory anxiety has a

positive and significant relation with effectual decision-making. These correlations are not moderated by gender. Furthermore, this study has failed to show a significant difference between male and female entrepreneurs regarding their intolerance of uncertainty.

The methodological approach of this research is in accordance with its aims. However, due to limitations regarding the sample size and its origin, generalizability can be limited. The discussion and conclusion show that two of the fourteen hypotheses are supported. Nevertheless, several important contributions have been made.

Despite suffering from some limitations, the results of this study provide insights into possible personal-level antecedents of an effectual or causal decision-making logic. Moreover, the research connected current effectuation literature with existing concepts. These findings indicate that individual-level antecedents of decision-making logics are present and can be explored. Contributions to several existing streams of literature are made by furthering the understanding of the influence of gender on both intolerance of uncertainty and the decision-making logic. Furthermore, it demonstrates that IU can be applied in entrepreneurship research and provides additional insights when used as a multidimensional model. Nevertheless, future research is needed to identify other personal-level antecedents of effectuation/causation.

VIII. REFERENCES

- Alsos, G. A., Clausen, T. H., & Solvoll, S. (2014). Towards a Better Measurement Scale of Causation and Effectuation. *Academy of Management Proceedings*. <https://doi.org/10.5465/ambpp.2014.13785abstract>
- Alvarez, S. A., & Barney, J. B. (2005). How do entrepreneurs organize firms under conditions of uncertainty? *Journal of Management*, 31(5), 776–793. <https://doi.org/10.1177/0149206305279486>
- Angehrn, A., Krakauer, R. L., & Carleton, R. N. (2020). The Impact of Intolerance of Uncertainty and Anxiety Sensitivity on Mental Health Among Public Safety Personnel: When the Uncertain is Unavoidable. *Cognitive Therapy and Research*. <https://doi.org/10.1007/s10608-020-10107-2>
- Arend, R. J., Sarooghi, H., & Burkemper, A. (2015). Effectuation as ineffectual? Applying the 3E theory-assessment framework to a proposed new theory of entrepreneurship. *Academy of Management Review*, 40(4), 630–651. <https://doi.org/10.5465/amr.2014.0455>
- Atinc, G., Simmering, M. J., & Kroll, M. J. (2012). Control variable use and reporting in macro and micro management research. *Organizational Research Methods*. <https://doi.org/10.1177/1094428110397773>
- Basevitz, P., Pushkar, D., Chaikelson, J., Conway, M., & Dalton, C. (2008). Age-related differences in worry and related processes. *International Journal of Aging and Human Development*, 66(4), 283–305. <https://doi.org/10.2190/AG.66.4.b>
- Bezerra de Melo, F. L. N., Da Silva, R. R., & De Almeida, T. N. V. (2019). Gender and entrepreneurship: A comparative study between the Causation and Effectuation approaches. *Brazilian Business Review*. <https://doi.org/10.15728/bbr.2019.16.3.5>
- Blanca, M. J., Alarcón, R., Arnau, J., Bono, R., & Bendayan, R. (2017). Non-normal data: Is ANOVA still a valid option? *Psicothema*. <https://doi.org/10.7334/psicothema2016.383>
- Bottesi, G., Carraro, E., Martignon, A., Cerea, S., & Ghisi, M. (2019). “I’m Uncertain: What Should I Do?”: an Investigation of Behavioral Responses to Everyday Life Uncertain Situations. *International Journal of Cognitive Therapy*. <https://doi.org/10.1007/s41811-019-00040-y>
- Bottesi, G., Martignon, A., Cerea, S., & Ghisi, M. (2018). Worry and associated cognitive features in Italian university students: Does gender make a difference? *Personality and Individual Differences*. <https://doi.org/10.1016/j.paid.2018.01.016>
- Brettel, M., Mauer, R., Engelen, A., & Küpper, D. (2012). Corporate effectuation: Entrepreneurial action and its impact on R&D project performance. *Journal of Business Venturing*, 27(2), 167–184. <https://doi.org/10.1016/j.jbusvent.2011.01.001>
- Brighetti, G., & Lucarelli, C. (2015). Gender differences in attitudes towards risk and ambiguity: When psycho-physiological measurements contradict sex-based stereotypes. *International Journal of Entrepreneurship and Small Business*. <https://doi.org/10.1504/IJESB.2015.066153>
- Brindley, C. (2005). Barriers to women achieving their entrepreneurial potential: Women and risk. *International Journal of Entrepreneurial Behaviour and Research*, 11(2), 144–161. <https://doi.org/10.1108/13552550510590554>
- Buhr, K., & Dugas, M. J. (2002). The intolerance of uncertainty scale: Psychometric properties of the English version. *Behaviour Research and Therapy*, 40(8), 931–945. [https://doi.org/10.1016/S0005-7967\(01\)00092-4](https://doi.org/10.1016/S0005-7967(01)00092-4)
- Cannatelli, B., Pedrini, M., & Braun, M. (2019). Individual-level antecedents of the entrepreneurial approach: the role of different types of passion in the Italian craft brewing industry. *International Entrepreneurship and Management Journal*, 15(4), 1193–1219. <https://doi.org/10.1007/s11365-019-00585-6>
- Carleton, R. N., Duranceau, S., Shulman, E. P., Zerff, M., Gonzales, J., & Mishra, S. (2016). Self-reported intolerance of uncertainty and behavioural decisions. *Journal of Behavior Therapy and Experimental Psychiatry*. <https://doi.org/10.1016/j.jbtep.2015.12.004>
- Carleton, R. N., Norton, M. A. P. J., & Asmundson, G. J. G. (2007). Fearing the unknown: A short version

- of the Intolerance of Uncertainty Scale. *Journal of Anxiety Disorders*, 21(1), 105–117. <https://doi.org/10.1016/j.janxdis.2006.03.014>
- Carmody, P. (2012). Another BRIC in the wall? South Africa's developmental impact and contradictory rise in Africa and beyond. *European Journal of Development Research*. <https://doi.org/10.1057/ejdr.2012.8>
- Chandler, G. N., DeTienne, D. R., McKelvie, A., & Mumford, T. V. (2011). Causation and effectuation processes: A validation study. *Journal of Business Venturing*, 26(3), 375–390. <https://doi.org/10.1016/j.jbusvent.2009.10.006>
- Cornwall, A. C., Byrne, K. A., & Worthy, D. A. (2018). Gender differences in preference for reward frequency versus reward magnitude in decision-making under uncertainty. *Personality and Individual Differences*. <https://doi.org/10.1016/j.paid.2018.06.031>
- Craney, T. A., & Surlis, J. G. (2002). Model-dependent variance inflation factor cutoff values. *Quality Engineering*. <https://doi.org/10.1081/QEN-120001878>
- Delmar, F., & Shane, S. (2003). Does business planning facilitate the development of new ventures? *Strategic Management Journal*. <https://doi.org/10.1002/smj.349>
- Denrell, J., & March, J. G. (2001). Adaptation as Information Restriction: The Hot Stove Effect. *Organization Science*. <https://doi.org/10.1287/orsc.12.5.523.10092>
- Dew, N., Read, S., Sarasvathy, S. D., & Wiltbank, R. (2009). Effectual versus predictive logics in entrepreneurial decision-making: Differences between experts and novices. *Journal of Business Venturing*, 24(4), 287–309. <https://doi.org/10.1016/j.jbusvent.2008.02.002>
- Dien, J. (2010). Evaluating two-step PCA of ERP data with Geomin, Infomax, Oblimin, Promax, and Varimax rotations. *Psychophysiology*. <https://doi.org/10.1111/j.1469-8986.2009.00885.x>
- Doruk, A., Dugenci, M., Ersöz, F., & Öznur, T. (2015). Intolerance of uncertainty and coping mechanisms in nonclinical young subjects. *Noropsikiyatri Arsivi*. <https://doi.org/10.5152/npa.2015.8779>
- Dugas, M. J., Schwartz, A., & Francis, K. (2004). Intolerance of uncertainty, worry, and depression. *Cognitive Therapy and Research*, 28(6), 835–842. <https://doi.org/10.1007/s10608-004-0669-0>
- Engel, Y., Dimitrova, N. G., Khapova, S. N., & Elfring, T. (2014). Uncertain but able: Entrepreneurial self-efficacy and novices' use of expert decision-logic under uncertainty. *Journal of Business Venturing Insights*. <https://doi.org/10.1016/j.jbvi.2014.09.002>
- European Commission. (2017). *2017 SBA Fact Sheet*. Retrieved from <https://ec.europa.eu/docsroom/documents/26562/attachments/1/translations/en/renditions/native>
- Fisher, G. (2012). Effectuation, causation, and bricolage: A behavioral comparison of emerging theories in entrepreneurship research. *Entrepreneurship: Theory and Practice*. <https://doi.org/10.1111/j.1540-6520.2012.00537.x>
- Freeston, M. H., Rhéaume, J., Letarte, H., Dugas, M. J., & Ladouceur, R. (1994). Why do people worry? *Personality and Individual Differences*. [https://doi.org/10.1016/0191-8869\(94\)90048-5](https://doi.org/10.1016/0191-8869(94)90048-5)
- Frese, T., Geiger, I., & Dost, F. (2020). An empirical investigation of determinants of effectual and causal decision logics in online and high-tech start-up firms. *Small Business Economics*, 54(3), 641–664. <https://doi.org/10.1007/s11187-019-00147-8>
- Frigotto, M. L., & Della Valle, N. (2018). Gender and the structuring of the entrepreneurial venture: An effectuation approach. *International Journal of Entrepreneurial Venturing*. <https://doi.org/10.1504/IJEV.2018.093918>
- Ghasemi, A., & Zahediasl, S. (2012). Normality tests for statistical analysis: A guide for non-statisticians. *International Journal of Endocrinology and Metabolism*. <https://doi.org/10.5812/ijem.3505>
- Grégoire, D. A., & Cherchem, N. (2020). A structured literature review and suggestions for future effectuation research. *Small Business Economics*, 54(3), 621–639. <https://doi.org/10.1007/s11187-019-00158-5>
- Grice, J. W., & Iwasaki, M. (2009). A Truly Multivariate Approach to Manova. *Applied Multivariate Research*. <https://doi.org/10.22329/amr.v12i3.660>
- Gunther McGrath, R. (1999). Falling Forward: Real Options Reasoning and Entrepreneurial Failure. *Academy of Management Review*, 24(1), 13–30. Retrieved from

- <http://10.0.21.89/AMR.1999.1580438%5Cnhttp://search.ebscohost.com/login.aspx?direct=true&db=buh&AN=1580438&site=ehost-live>
- Gupta, V. K., Turban, D. B., & Bhawe, N. M. (2008). The Effect of Gender Stereotype Activation on Entrepreneurial Intentions. *Journal of Applied Psychology*. <https://doi.org/10.1037/0021-9010.93.5.1053>
- Gupta, V. K., Turban, D. B., Wasti, S. A., & Sikdar, A. (2009). The role of gender stereotypes in perceptions of entrepreneurs and intentions to become an entrepreneur. *Entrepreneurship: Theory and Practice*. <https://doi.org/10.1111/j.1540-6520.2009.00296.x>
- Guzman, J., & Kacperczyk, A. (Olenka). (2019). Gender gap in entrepreneurship. *Research Policy*. <https://doi.org/10.1016/j.respol.2019.03.012>
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). Multivariate Data Analysis. *Vectors*. <https://doi.org/10.1016/j.ijpharm.2011.02.019>
- Hale, W., Richmond, M., Bennett, J., Berzins, T., Fields, A., Weber, D., ... Osman, A. (2016). Resolving uncertainty about the intolerance of uncertainty scale-12: Application of modern psychometric strategies. *Journal of Personality Assessment*. <https://doi.org/10.1080/00223891.2015.1070355>
- Harms, R., & Schiele, H. (2012). Antecedents and consequences of effectuation and causation in the international new venture creation process. *Journal of International Entrepreneurship*. <https://doi.org/10.1007/s10843-012-0089-2>
- Hauser, A., Eggers, F., & Guldenberg, S. (2020). Strategic decision-making in SMEs: effectuation, causation, and the absence of strategy. *Small Business Economics*, 54(3), 775–790. <https://doi.org/10.1007/s11187-019-00152-x>
- Heene, M., Hilbert, S., Draxler, C., Ziegler, M., & Bühner, M. (2011). Masking Misfit in Confirmatory Factor Analysis by Increasing Unique Variances: A Cautionary Note on the Usefulness of Cutoff Values of Fit Indices. *Psychological Methods*. <https://doi.org/10.1037/a0024917>
- Heilman, M. E. (2012). Gender stereotypes and workplace bias. *Research in Organizational Behavior*. <https://doi.org/10.1016/j.riob.2012.11.003>
- Helsen, K., Van Den Bussche, E., Vlaeyen, J. W. S., & Goubert, L. (2013). Confirmatory factor analysis of the Dutch Intolerance of Uncertainty Scale: Comparison of the full and short version. *Journal of Behavior Therapy and Experimental Psychiatry*, 44(1), 21–29. <https://doi.org/10.1016/j.jbtep.2012.07.004>
- Henseler, J., Hubona, G., & Ray, P. A. (2016). Using PLS path modeling in new technology research: Updated guidelines. *Industrial Management and Data Systems*. <https://doi.org/10.1108/IMDS-09-2015-0382>
- Hill, E. M., & Hamm, A. (2019). Intolerance of uncertainty, social support, and loneliness in relation to anxiety and depressive symptoms among women diagnosed with ovarian cancer. *Psycho-Oncology*. <https://doi.org/10.1002/pon.4975>
- Hillen, M. A., Gutheil, C. M., Strout, T. D., Smets, E. M. A., & Han, P. K. J. (2017). Tolerance of uncertainty: Conceptual analysis, integrative model, and implications for healthcare. *Social Science and Medicine*. <https://doi.org/10.1016/j.socscimed.2017.03.024>
- Hoaglin, D. C., & Iglewicz, B. (1987). Fine-tuning some resistant rules for outlier labeling. *Journal of the American Statistical Association*. <https://doi.org/10.1080/01621459.1987.10478551>
- Hong, R. Y., & Lee, S. S. M. (2015). Further clarifying prospective and inhibitory intolerance of uncertainty: Factorial and construct validity of test scores from the intolerance of uncertainty scale. *Psychological Assessment*. <https://doi.org/10.1037/pas0000074>
- Huberty, C. J., & Morris, J. D. (1989). Multivariate Analysis Versus Multiple Univariate Analyses. *Psychological Bulletin*. <https://doi.org/10.1037/0033-2909.105.2.302>
- International Monetary Fund. (2019). *THE KINGDOM OF THE NETHERLANDS—NETHERLANDS*. IMF Country Report No. 19/44. Washington. Retrieved from <https://www.imf.org/en/Publications/CR/Issues/2019/02/12/The-Kingdom-of-the-Netherlands-Netherlands-2019-Article-IV-Consultation-Press-Release-Staff-46592>
- Johnson, J. G., & Busemeyer, J. R. (2010). Decision making under risk and uncertainty. *Wiley Interdisciplinary Reviews: Cognitive Science*. <https://doi.org/10.1002/wcs.76>

- Karami, M., Wooliscroft, B., & McNeill, L. (2019). Effectuation and internationalisation: a review and agenda for future research. *Small Business Economics*. <https://doi.org/10.1007/s11187-019-00183-4>
- Kitching, J., & Rouse, J. (2020). Contesting effectuation theory: Why it does not explain new venture creation. *International Small Business Journal: Researching Entrepreneurship*. <https://doi.org/10.1177/0266242620904638>
- Koch, A. J., D'Mello, S. D., & Sackett, P. R. (2015). A meta-analysis of gender stereotypes and bias in experimental simulations of employment decision making. *Journal of Applied Psychology*. <https://doi.org/10.1037/a0036734>
- Ladouceur, R., Gosselin, P., & Dugas, M. J. (2000). Experimental manipulation of intolerance of uncertainty: A study of a theoretical model of worry. *Behaviour Research and Therapy*. [https://doi.org/10.1016/S0005-7967\(99\)00133-3](https://doi.org/10.1016/S0005-7967(99)00133-3)
- Ladouceur, R., Talbot, F., & Dugas, M. J. (1997). Behavioral expressions of intolerance of uncertainty in worry: Experimental findings. *Behavior Modification*. <https://doi.org/10.1177/01454455970213006>
- Liao, X., Li, Q., Yang, X., Zhang, W., & Li, W. (2008). Multiobjective optimization for crash safety design of vehicles using stepwise regression model. In *Structural and Multidisciplinary Optimization*. <https://doi.org/10.1007/s00158-007-0163-x>
- Luhmann, C. C., Ishida, K., & Hajcak, G. (2011). Intolerance of uncertainty and decisions about delayed, probabilistic rewards. *Behavior Therapy*, 42(3), 378–386. <https://doi.org/10.1016/j.beth.2010.09.002>
- Madzivhandila, T. S., & Musara, M. (2020). Taking responsibility for entrepreneurship development in South Africa: The role of local municipalities. *Local Economy*. <https://doi.org/10.1177/0269094220922820>
- McEvoy, P. M., Hyett, M. P., Shihata, S., Price, J. E., & Strachan, L. (2019). The impact of methodological and measurement factors on transdiagnostic associations with intolerance of uncertainty: A meta-analysis. *Clinical Psychology Review*. <https://doi.org/10.1016/j.cpr.2019.101778>
- McEvoy, P. M., & Mahoney, A. E. J. (2011). Achieving certainty about the structure of intolerance of uncertainty in a treatment-seeking sample with anxiety and depression. *Journal of Anxiety Disorders*. <https://doi.org/10.1016/j.janxdis.2010.08.010>
- McEvoy, P. M., & Mahoney, A. E. J. (2012). To Be Sure, To Be Sure: Intolerance of Uncertainty Mediates Symptoms of Various Anxiety Disorders and Depression. *Behavior Therapy*. <https://doi.org/10.1016/j.beth.2011.02.007>
- McKelvie, A., Chandler, G. N., DeTienne, D. R., & Johansson, A. (2020). The measurement of effectuation: highlighting research tensions and opportunities for the future. *Small Business Economics*, 54(3), 689–720. <https://doi.org/10.1007/s11187-019-00149-6>
- McMullen, J. S., & Shepherd, D. A. (2006). Entrepreneurial action and the role of uncertainty in the theory of the entrepreneur. *Academy of Management Review*, 31(1), 132–152. <https://doi.org/10.5465/AMR.2006.19379628>
- Mischel, W., & Shoda, Y. (1998). RECONCILING PROCESSING DYNAMICS AND PERSONALITY DISPOSITIONS. *Annual Review of Psychology*, 49(1), 229–258. <https://doi.org/10.1146/annurev.psych.49.1.229>
- Murnieks, C. Y., Cardon, M. S., & Haynie, J. M. (2020). Fueling the fire: Examining identity centrality, affective interpersonal commitment and gender as drivers of entrepreneurial passion. *Journal of Business Venturing*. <https://doi.org/10.1016/j.jbusvent.2018.10.007>
- Norman, G. (2010). Likert scales, levels of measurement and the “laws” of statistics. *Advances in Health Sciences Education*. <https://doi.org/10.1007/s10459-010-9222-y>
- O'Brien, R. G., & Kaiser, M. K. (1985). MANOVA Method for Analyzing Repeated Measures Designs. An Extensive Primer. *Psychological Bulletin*. <https://doi.org/10.1037/0033-2909.97.2.316>
- Olson, C. L. (1974). Comparative robustness of six tests in multivariate analysis of variance. *Journal of the American Statistical Association*. <https://doi.org/10.1080/01621459.1974.10480224>
- Osborne, J. W., & Waters, E. (2002). Four Assumptions of Multiple Regression That Researchers Should

Always Test. *Practical Assessment, Research and Evaluation*.

- Perry, J. T., Chandler, G. N., & Markova, G. (2012). Entrepreneurial Effectuation: A Review and Suggestions for Future Research. *Entrepreneurship: Theory and Practice*, 36(4), 837–861. <https://doi.org/10.1111/j.1540-6520.2010.00435.x>
- Petrocelli, J. V. (2003). Hierarchical multiple regression in counseling research: Common problems and possible remedies. *Measurement and Evaluation in Counseling and Development*. <https://doi.org/10.1080/07481756.2003.12069076>
- Phaal, R. (2004). Technology roadmapping - A planning framework for evolution and revolution. *Technological Forecasting and Social Change*. [https://doi.org/10.1016/S0040-1625\(03\)00072-6](https://doi.org/10.1016/S0040-1625(03)00072-6)
- Polzin, F., Sanders, M., & Stavlöt, U. (2018). Do investors and entrepreneurs match? – Evidence from The Netherlands and Sweden. *Technological Forecasting and Social Change*. <https://doi.org/10.1016/j.techfore.2017.07.016>
- Porter, M. E. (2008). The five competitive forces that shape strategy. *Harvard Business Review*.
- Rauch, A., & Frese, M. (2007). Let's put the person back into entrepreneurship research: A meta-analysis on the relationship between business owners' personality traits, business creation, and success. *European Journal of Work and Organizational Psychology*. <https://doi.org/10.1080/13594320701595438>
- Razali, N. M., & Wah, Y. B. (2011). Power comparisons of Shapiro-Wilk, Kolmogorov-Smirnov, Lilliefors and Anderson-Darling tests. *Journal of Statistical Modeling and Analytics*. <https://doi.org/doi:10.1515/bile-2015-0008>
- Read, S., & Sarasvathy, S. D. (2005). Knowing What to Do and Doing What You Know. *The Journal of Private Equity*, 9(1), 45–62. <https://doi.org/10.3905/jpe.2005.605370>
- Reio, T. G., & Shuck, B. (2015). Exploratory Factor Analysis: Implications for Theory, Research, and Practice. *Advances in Developing Human Resources*. <https://doi.org/10.1177/1523422314559804>
- Reymen, I. M. M. J., Andries, P., Berends, H., Mauer, R., Stephan, U., & van Burg, E. (2015). Understanding Dynamics of Strategic Decision Making in Venture Creation: A Process Study of Effectuation and Causation. *Strategic Entrepreneurship Journal*. <https://doi.org/10.1002/sej.1201>
- Robichaud, M., Dugas, M. J., & Conway, M. (2003). Gender differences in worry and associated cognitive-behavioral variables. *Journal of Anxiety Disorders*, 17(5), 501–516. [https://doi.org/10.1016/S0887-6185\(02\)00237-2](https://doi.org/10.1016/S0887-6185(02)00237-2)
- Roma, V. G., & Hope, D. A. (2017). Are we certain about which measure of intolerance of uncertainty to use yet? *Cognitive Behaviour Therapy*. <https://doi.org/10.1080/16506073.2016.1252792>
- Rudman, L. A., & Glick, P. (2001). Prescriptive gender stereotypes and backlash toward agentic women. *Journal of Social Issues*. <https://doi.org/10.1111/0022-4537.00239>
- Sarasvathy, S. D. (2001). Causation and effectuation: Toward a theoretical shift from economic inevitability to entrepreneurial contingency. *Academy of Management Review*, 26(2), 243–263. <https://doi.org/10.5465/AMR.2001.4378020>
- Sarasvathy, S. D. (2008). *Effectuation: Elements of entrepreneurial expertise*. *Effectuation: Elements of Entrepreneurial Expertise*. Northampton, MA: Edward Elgar Publishing, Inc. <https://doi.org/10.4337/9781848440197>
- Schmitt, T. A. (2011). Current methodological considerations in exploratory and confirmatory factor analysis. *Journal of Psychoeducational Assessment*. <https://doi.org/10.1177/0734282911406653>
- Schwertman, N. C., Owens, M. A., & Adnan, R. (2004). A simple more general boxplot method for identifying outliers. *Computational Statistics and Data Analysis*. <https://doi.org/10.1016/j.csda.2003.10.012>
- Sexton, D. L., & Bowman-Upton, N. (1990). Female and male entrepreneurs: Psychological characteristics and their role in gender-related discrimination. *Journal of Business Venturing*, 5(1), 29–36. [https://doi.org/10.1016/0883-9026\(90\)90024-N](https://doi.org/10.1016/0883-9026(90)90024-N)
- Shane, S., & Venkataraman, S. (2000). The Promise of Entrepreneurship as a Field of Research Author (s): Scott Shane and S. Venkataraman Source : The Academy of Management Review , Vol . 25 ,

- No . 1 (Jan ., 2000), pp . 217-226 Published by : Academy of Management Stable URL : [http://www. The Academy of Management Review](http://www.TheAcademyofManagementReview), 25(1), 217–226. Retrieved from <https://www.jstor.org/stable/259271>
- Shepherd, D. A., Williams, T. A., & Patzelt, H. (2015). Thinking About Entrepreneurial Decision Making: Review and Research Agenda. *Journal of Management*. <https://doi.org/10.1177/0149206314541153>
- Shihata, S., McEvoy, P. M., Mullan, B. A., & Carleton, R. N. (2016). Intolerance of uncertainty in emotional disorders: What uncertainties remain? *Journal of Anxiety Disorders*, 41, 115–124. <https://doi.org/10.1016/j.janxdis.2016.05.001>
- Siebelink, R., Halman, J. I. M., & Hofman, E. (2016). Scenario-Driven Roadmapping to cope with uncertainty: Its application in the construction industry. *Technological Forecasting and Social Change*. <https://doi.org/10.1016/j.techfore.2016.01.030>
- Sijtsma, K. (2009a). On the use, the misuse, and the very limited usefulness of cronbach’s alpha. *Psychometrika*. <https://doi.org/10.1007/s11336-008-9101-0>
- Sijtsma, K. (2009b). Over misverstanden rond Cronbachs alfa en de wenselijkheid van alternatieven. *De Psycholoog*.
- Soer, T. (2019). *The influence of uncertainty and cultural tightnesslooseness on the decision-making processes of entrepreneurs in South Africa*. University of Twente.
- Strout, T. D., Hillen, M., Gutheil, C., Anderson, E., Hutchinson, R., Ward, H., ... Han, P. K. J. (2018). Tolerance of uncertainty: A systematic review of health and healthcare-related outcomes. *Patient Education and Counseling*, 101(9), 1518–1537. <https://doi.org/10.1016/j.pec.2018.03.030>
- Swisher, L. L., Beckstead, J. W., & Bebeau, M. J. (2004). Factor analysis as a tool for survey analysis using a professional role orientation inventory as an example. *Physical Therapy*. <https://doi.org/10.1093/ptj/84.9.784>
- Tanovic, E., Hajcak, G., & Joormann, J. (2018). Hating waiting: Individual differences in willingness to wait in uncertainty. *Journal of Experimental Psychopathology*. <https://doi.org/10.1177/2043808718778982>
- Thibodeau, M. A., Carleton, R. N., Gómez-Pérez, L., & Asmundson, G. J. G. (2013). “what if i make a mistake?”: Intolerance of uncertainty is associated with poor behavioral performance. *Journal of Nervous and Mental Disease*, 201(9), 760–766. <https://doi.org/10.1097/NMD.0b013e3182a21298>
- Todorov, V., & Filzmoser, P. (2010). Robust statistic for the one-way MANOVA. *Computational Statistics and Data Analysis*. <https://doi.org/10.1016/j.csda.2009.08.015>
- Urban, B. (2020). Entrepreneurial alertness, self-efficacy and social entrepreneurship intentions. *Journal of Small Business and Enterprise Development*. <https://doi.org/10.1108/JSBED-08-2019-0285>
- Van Essen, B. (2019). *Influence of uncertainty intolerance and entrepreneurial passion on the approach for decision-making in venture creation; causation or effectuation – The case of South Africa*. University of Twente.
- Van Staveren, I. (2014). The Lehman Sisters hypothesis. *Cambridge Journal of Economics*. <https://doi.org/10.1093/cje/beu010>
- Welter, Chris, Mauer, R., & Wuebker, R. J. (2016). Bridging Behavioral Models and Theoretical Concepts: Effectuation and Bricolage in the Opportunity Creation Framework. *Strategic Entrepreneurship Journal*. <https://doi.org/10.1002/sej.1215>
- Welter, Christopher, & Kim, S. (2018). Effectuation under risk and uncertainty: A simulation model. *Journal of Business Venturing*, 33(1), 100–116. <https://doi.org/10.1016/j.jbusvent.2017.11.005>
- Williams, M. N., Grajales, C. A. G., & Kurkiewicz, D. (2013). Assumptions of multiple regression: Correcting two misconceptions. *Practical Assessment, Research and Evaluation*.
- Wiltbank, R., Dew, N., Read, S., & Sarasvathy, S. D. (2006). What to do next? The case for non-predictive strategy. *Strategic Management Journal*, 27(10), 981–998. <https://doi.org/10.1002/smj.555>
- Yong, A. G., & Pearce, S. (2013). A Beginner’s Guide to Factor Analysis: Focusing on Exploratory Factor Analysis. *Tutorials in Quantitative Methods for Psychology*.

<https://doi.org/10.20982/tqmp.09.2.p079>

Zhang, Y., Cui, L., Zhang, G., Sarasvathy, S., & Anusha, R. (2019). An Exploratory Study of Antecedents of Entrepreneurial Decision-Making Logics: The Role of Self-Efficacy, Optimism, and Perspective Taking. *Emerging Markets Finance and Trade*, 55(4), 781–794.
<https://doi.org/10.1080/1540496X.2018.1478283>

IX. APPENDICES

A: MEASUREMENT SCALES

Table 8

Dutch scale of Intolerance of uncertainty copied from (*Helsen et al., 2013*)

		Sterk mee onees	Mee oneens	Eens noch oneens	Mee eens	Sterk mee eens
Prospective anxiety						
1	Onvoorziene gebeurtenissen brengen mij ernstig van slag	1	2	3	4	5
2	Ik vind het frustrerend om niet over alle benodigde informatie te beschikken	1	2	3	4	5
3	Men moet altijd vooruitkijken om verrassingen te voorkomen	1	2	3	4	5
4	De kleinste onvoorziene gebeurtenis kan alles verpesten, ondanks de beste planning	1	2	3	4	5
5	Ik wil altijd weten wat de toekomst in petto heeft voor me	1	2	3	4	5
6	Ik kan er niet tegen om verrast te worden	1	2	3	4	5
7	Ik zou in staat moeten zijn om alles vooraf te organiseren	1	2	3	4	5
Inhibitory anxiety						
8	Onzekerheid belet mij om het beste uit het leven te halen	1	2	3	4	5
9	Als ik in actie moet komen, voel ik me verlamd door onzekerheid	1	2	3	4	5
10	Als ik onzeker ben, kan ik niet goed functioneren	1	2	3	4	5
11	Zelfs de kleinste twijfel kan mij ervan weerhouden tot actie over te gaan	1	2	3	4	5
12	Ik moet alle onzekere situaties vermijden	1	2	3	4	5

Table 9*Intolerance of Uncertainty scale copied from (Carleton et al., 2007)*

		Strongly disa- gree	Disagree	Agree nor Dis- agree	Agree	Strongly Agree
Prospective anxiety						
1	Unforeseen events upset me greatly	1	2	3	4	5
2	It frustrates me not having all the in- formation I need	1	2	3	4	5
3	One should always look ahead so as to avoid surprises	1	2	3	4	5
4	A small, unforeseen event can spoil everything, even with the best of planning	1	2	3	4	5
5	I always want to know what the fu- ture has in store for me	1	2	3	4	5
6	I can't stand being taken by surprise	1	2	3	4	5
7	I should be able to organize every- thing in advance	1	2	3	4	5
Inhibitory anxiety						
8	Uncertainty keeps me from living a full life	1	2	3	4	5
9	When it's time to act, uncertainty pa- ralyses me	1	2	3	4	5
10	When I am uncertain I can't function very well	1	2	3	4	5
11	The smallest doubt can stop me from acting	1	2	3	4	5
12	I must get away from all uncertain situations	1	2	3	4	5

*Both Alsos et al. (2014) tables are omitted as they may not be published

B. CRONBACH'S ALPHA

Table 10
Cronbach's α per construct

Construct	Cronbach's α	Cronbach's α based on standardized items	N of items
Causation	.577	.593	5
Effectuation	.798	.797	5
Prospective Anxiety	.806	.804	7
Inhibitory Anxiety	.857	.861	5
Intolerance of Uncertainty	.877	.876	12
Causation (<i>question 3 omitted</i>)	.636	.639	4

C. BARLETT'S TEST OF SPHERICITY, KMO & MSA

Table 11
KMO and Bartlett's test per construct

	Intolerance of Uncertainty	Effectuation / Causation	Effectuation / Causation (<i>question 3 omitted</i>)
KMO measure of sampling adequacy	.888	.751	.755
Bartlett's test of Sphericity			
Approx. Chi-Square	1175.684	545.145	523.317
Degrees of Freedom	66	45	36
Significance	< .001	< .001	< .001

Table 12
Measure Sampling Adequacy Intolerance of Uncertainty

	1	2	3	4	5	6	7	8	9	10	11	12
Unforeseen events	.885											
Missing Information		.873										
Avoid surprises			.841									
Unforeseen events				.924								
Know the future					.881							
Taken by surprise						.927						
Organize in Advance							.857					
Uncertainty keeps from living								.919				
Paralyses									.839			
Function under uncertainty										.879		
Doubt											.878	
Uncertain situations												.917

Table 13
Measure Sampling Adequacy Causation/Effectuation

	1	2	3	4	5	6	7	8	9	10
Goal-oriented	.802									
Expected returns		.685								
Pre-existing knowledge			.640							
Competitive analysis				.619						
Uncertain future					.685					
Means-oriented						.723				
Affordable loss							.834			
Contingencies								.817		
Commitments									.778	
Unpredictable future										.776

Table 14
Measure Sampling Adequacy Causation/Effectuation adjusted

	1	2	3	4	5	6	7	8	9
Goal-oriented	.797								
Expected returns		.678							
Competitive analysis			.618						
Uncertain future				.681					
Means-oriented					.738				
Affordable loss						.838			
Contingencies							.827		
Commitments								.765	
Unpredictable future									.775

D. EXPLORATORY FACTOR ANALYSIS

Table 15 EFA
Matrices Intolerance of Uncertainty

Intolerance of Uncertainty	Pattern Matrix		Structure Matrix (Oblimin rotation)	
	1	2	1	2
Unforeseen events		.394		.550
Missing Information		.519		.552
Avoid surprises		.539		.493
Unforeseen events		.439		.577
Know the future		.730		.758
Taken by surprise		.435		.599
Organize in Advance		.712		.665
Uncertainty keeps from living	.485		.664	
Paralyses	.890		.837	
Function under uncertainty	.747		.758	
Doubt	.797		.756	
Uncertain situations	.570		.687	

Figure 5
 Rotated Factor plot Intolerance of Uncertainty

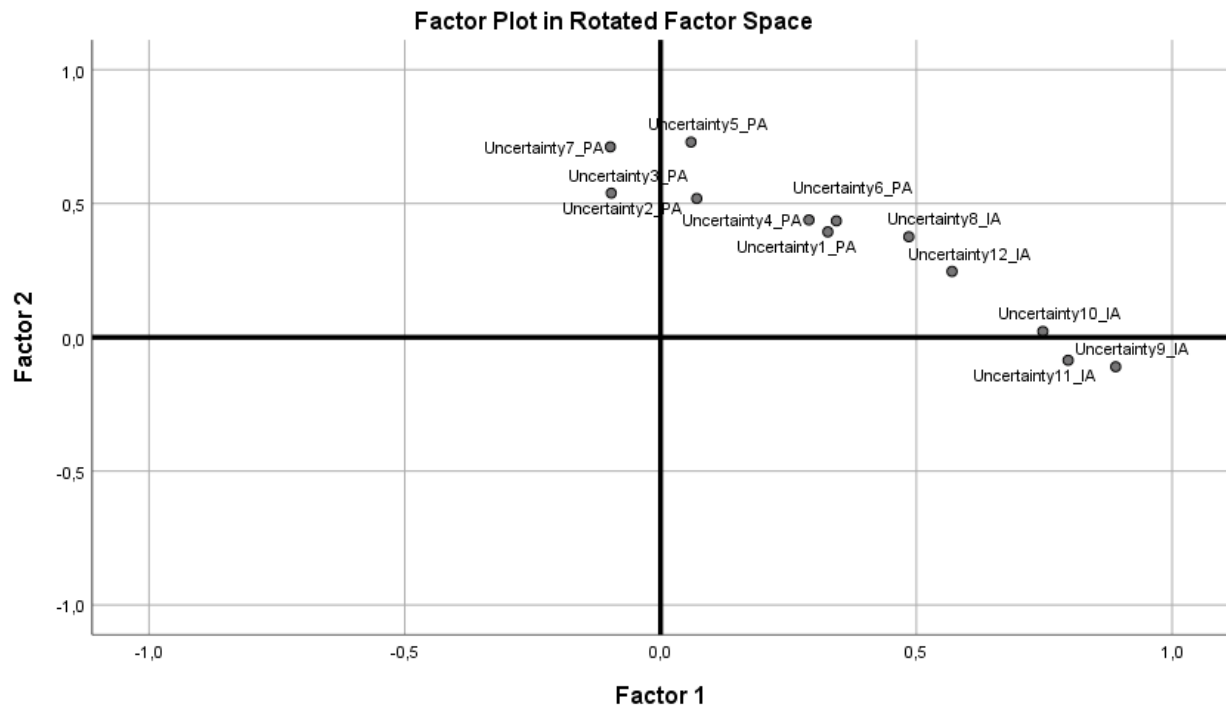


Table 16
 Matrices Effectuation/Causation

Effectuation/Causation	Pattern Matrix		Structure Matrix (Oblimin rotation)	
	1	2	1	2
Goal-oriented		.243		.365
Expected returns		.359		.446
Pre-existing knowledge		.077		.132
Competitive analysis		.658		.753
Uncertain future		.537		.661
Means-oriented	.678		.740	
Affordable loss	.508		.516	
Contingencies	.657		.731	
Commitments	.582		.579	
Unpredictable future	.763		.761	

Figure 6
 Rotated Factor plot Effectuation/Causation

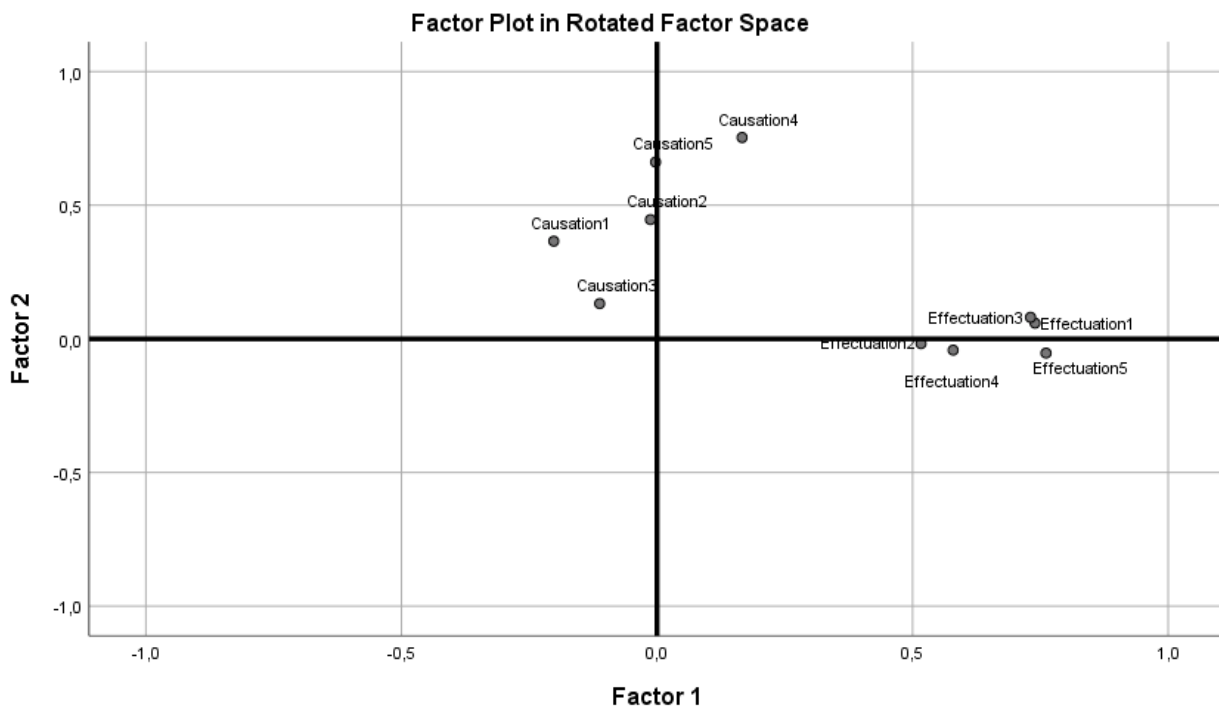
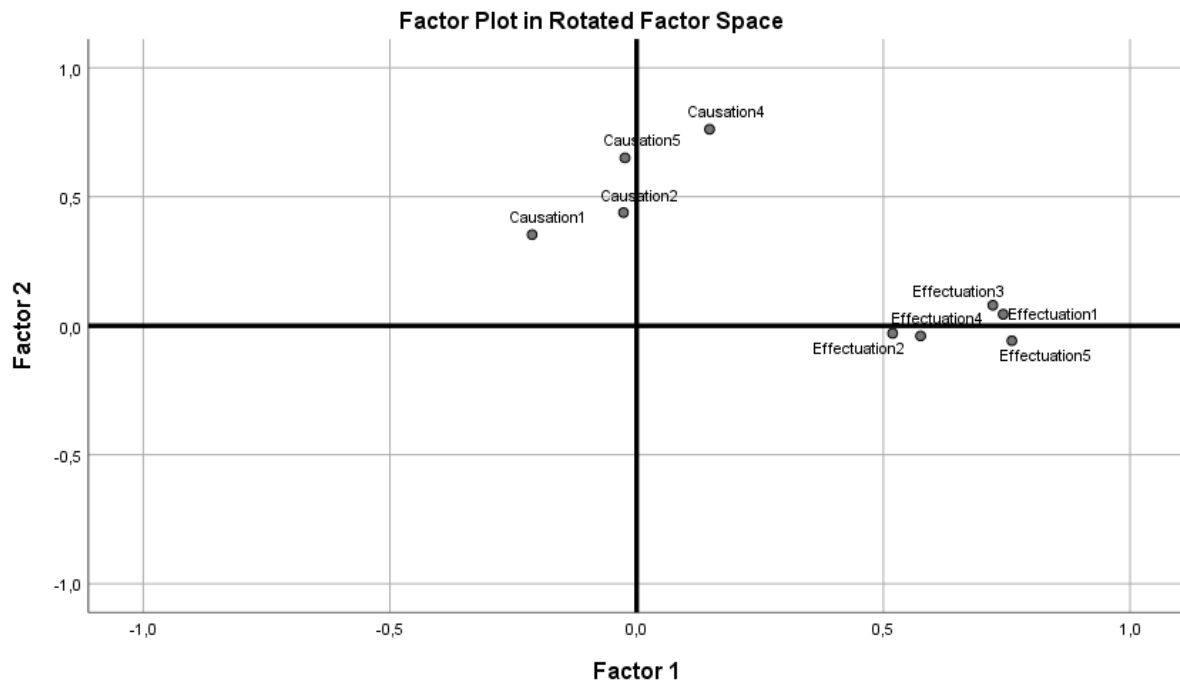


Table 17
 Matrices Effectuation/Causation question 3 omitted

Effectuation/Causation <i>question 3 omitted</i>	Pattern Matrix		Structure Matrix (Oblimin rotation)	
	1	2	1	2
Goal-oriented		.238		.353
Expected returns		.359		.439
Competitive analysis		.675		.761
Uncertain future		.537		.650
Means-oriented	.691		.743	
Affordable loss	.516		.519	
Contingencies	.652		.722	
Commitments	.576		.576	
Unpredictable future	.764		.760	

Figure 7
 Rotated Factor plot Effectuation/Causation question 3 omitted



E. MULTIPLE REGRESSION ASSUMPTIONS

Table 18
 Kurtosis and Skewness per construct

	N	Skewness		Kurtosis	
		Statistic	Std. Error	Statistic	Std. Error
Prospective anxiety	242	.169	.156	-.181	.312
Inhibitory anxiety	242	.975	.156	.482	.312
Intolerance of Uncertainty	242	.449	.156	-.115	.312
Effectuation	242	.208	.156	-.525	.312
Causation	242	-.500	.156	.398	.312
Causation question 3 omitted	242	-.799	.156	1.064	.312

Figure 8
Normal distribution of the error terms IV: Inhibitory and Prospective Anxiety

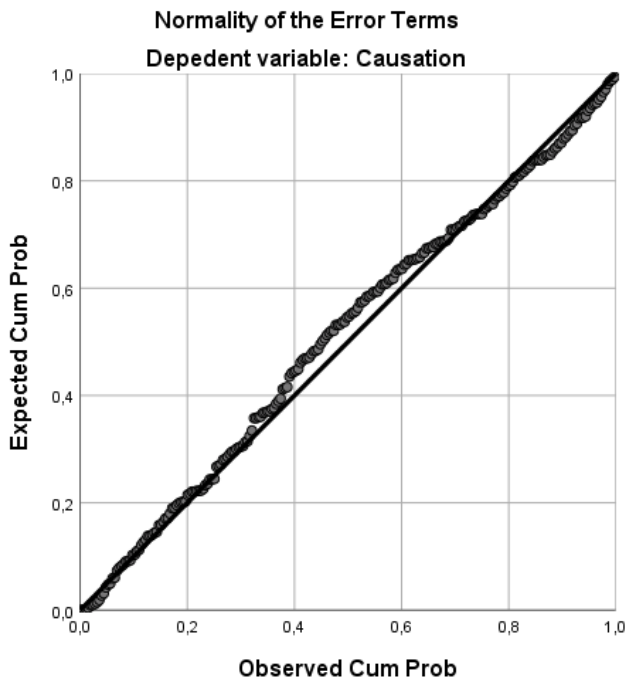


Figure 9
Normal distribution of the error terms IV: Intolerance of uncertainty

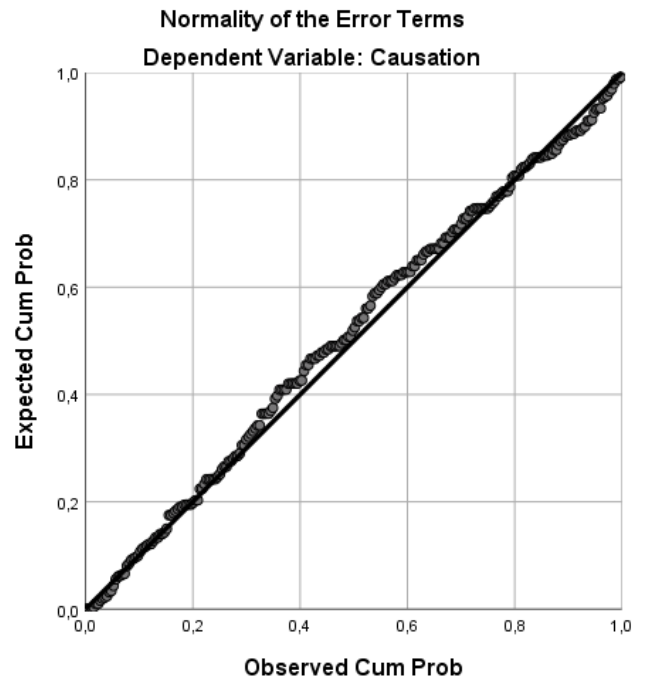


Figure 9
Normal distribution of the error terms IV: Intolerance of uncertainty

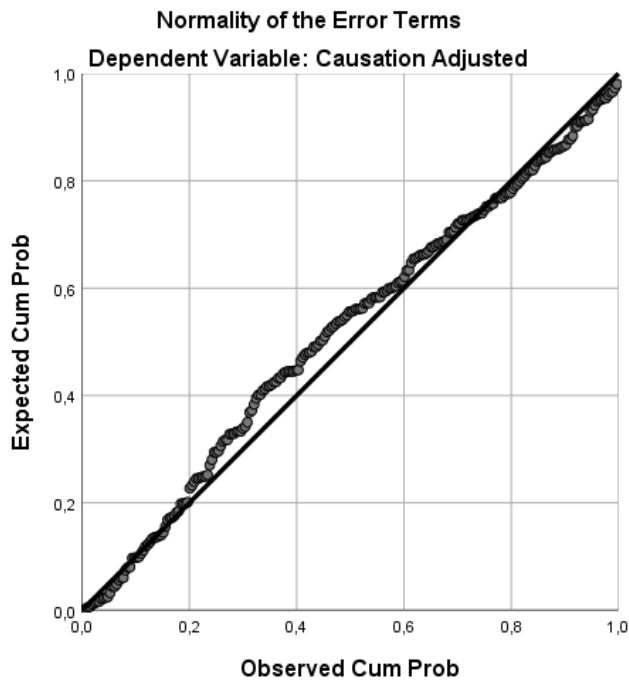


Figure 10
Normal distribution of the error terms IV: Inhibitory and Prospective Anxiety

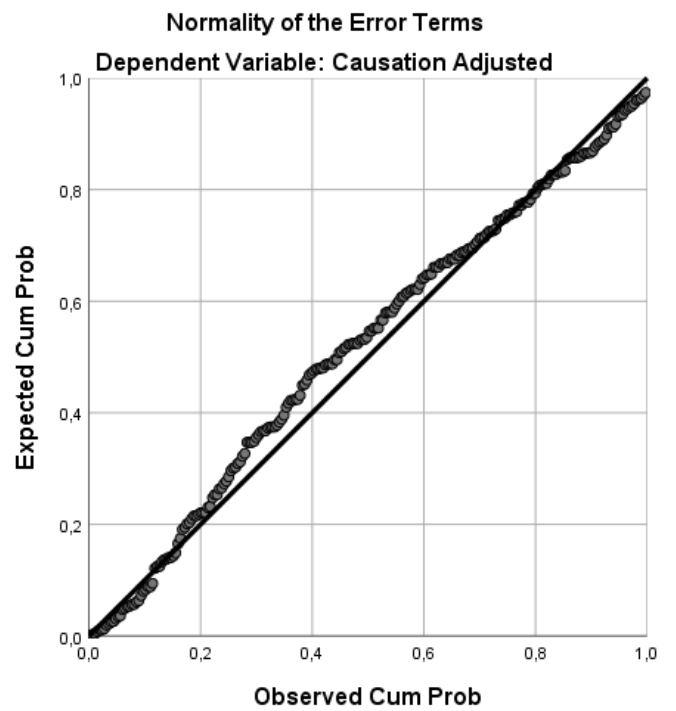


Figure 11
Normal distribution of the error terms IV: Intolerance of uncertainty

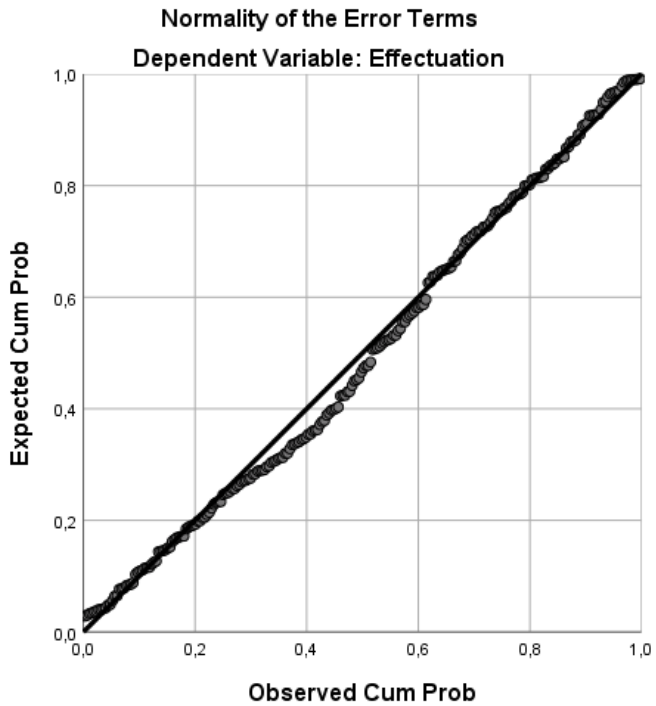


Figure 12
Normal distribution of the error terms IV: Inhibitory and Prospective Anxiety

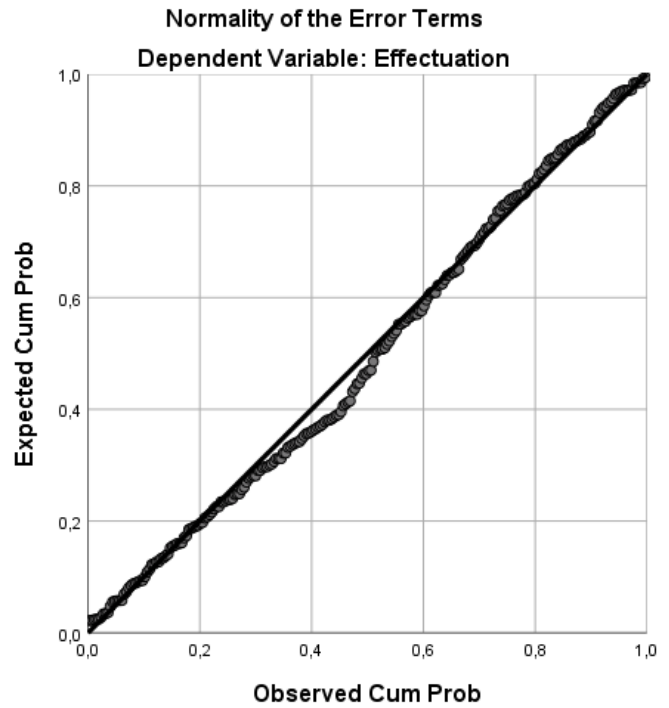


Figure 13
Homoscedasticity, IV: Inhibitory and Prospective Anxiety

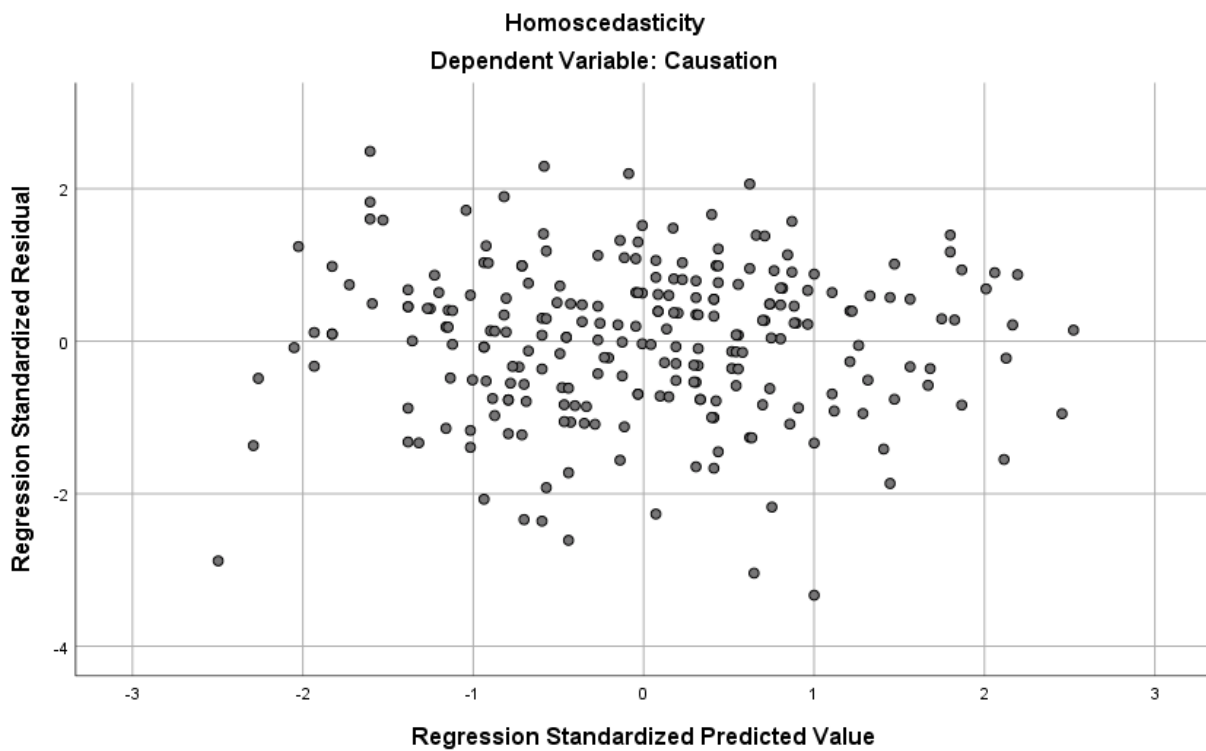


Figure 14
Homoscedasticity, IV: Intolerance of Uncertainty

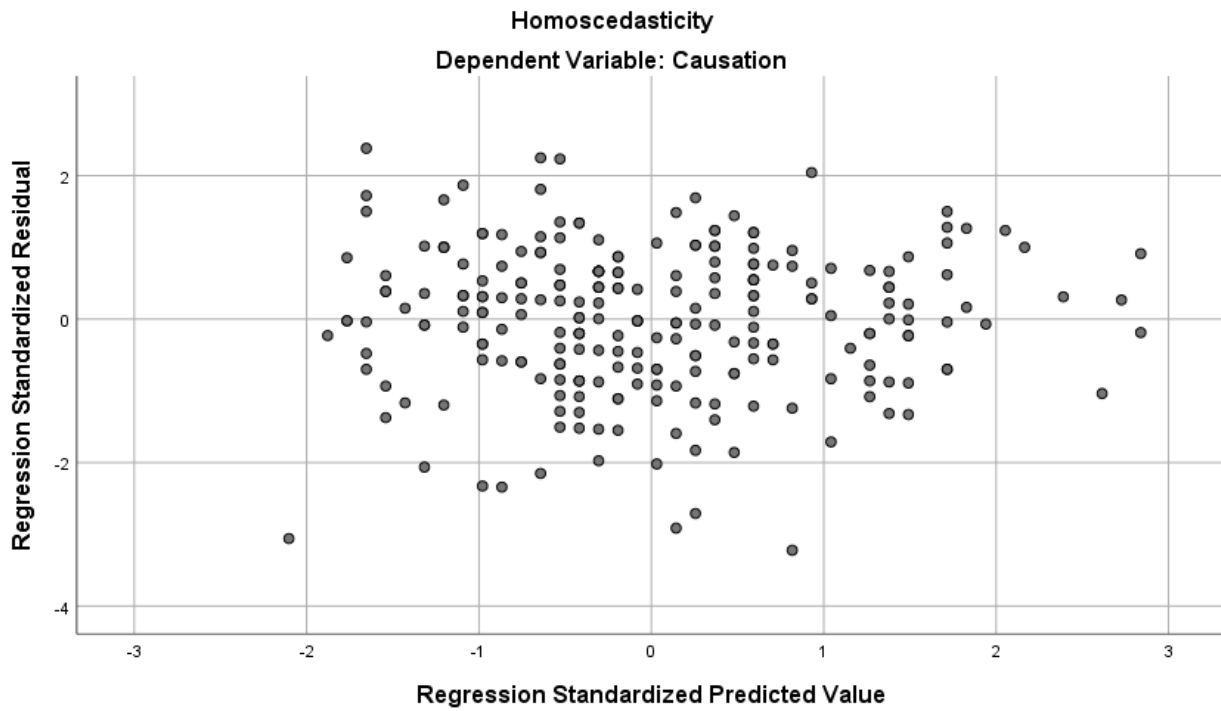


Figure 15
Homoscedasticity, IV: Inhibitory and Prospective Anxiety

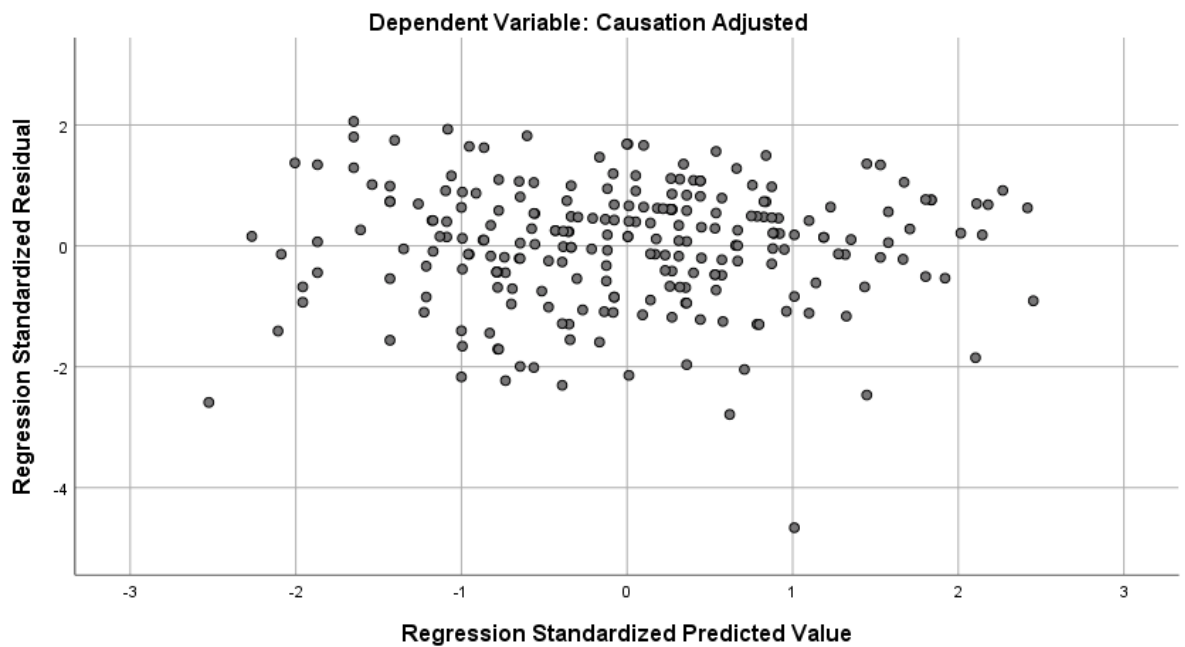


Figure 16
Homoscedasticity, IV: Intolerance of Uncertainty

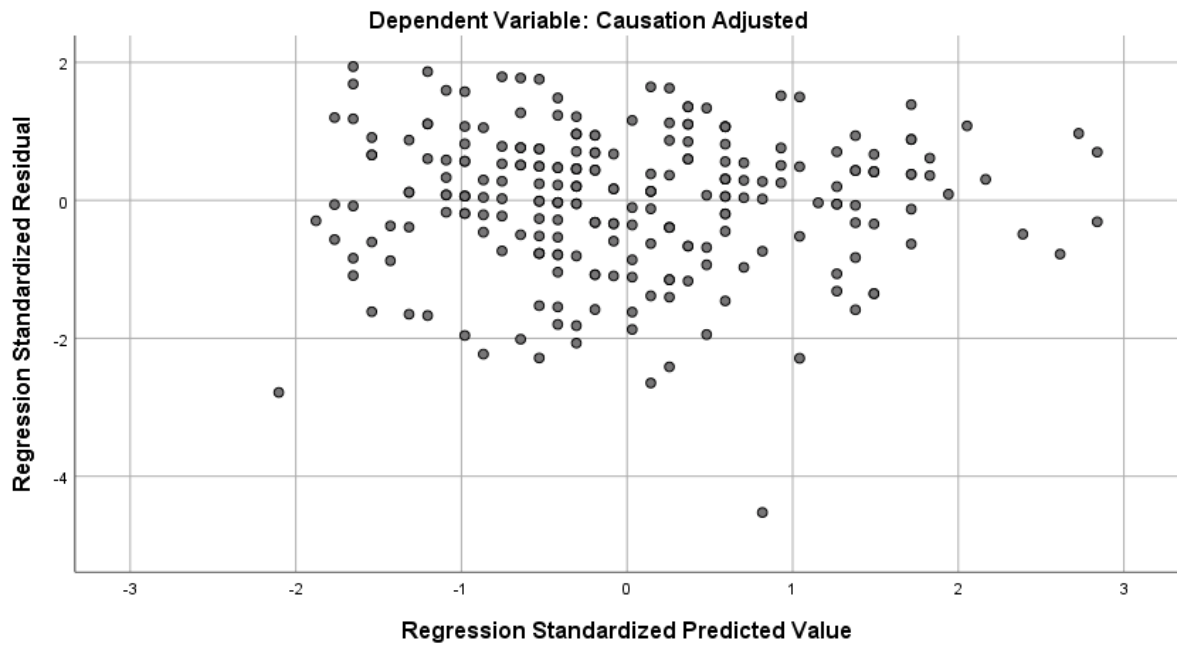


Figure 16
Homoscedasticity, IV: Inhibitory and Prospective Anxiety

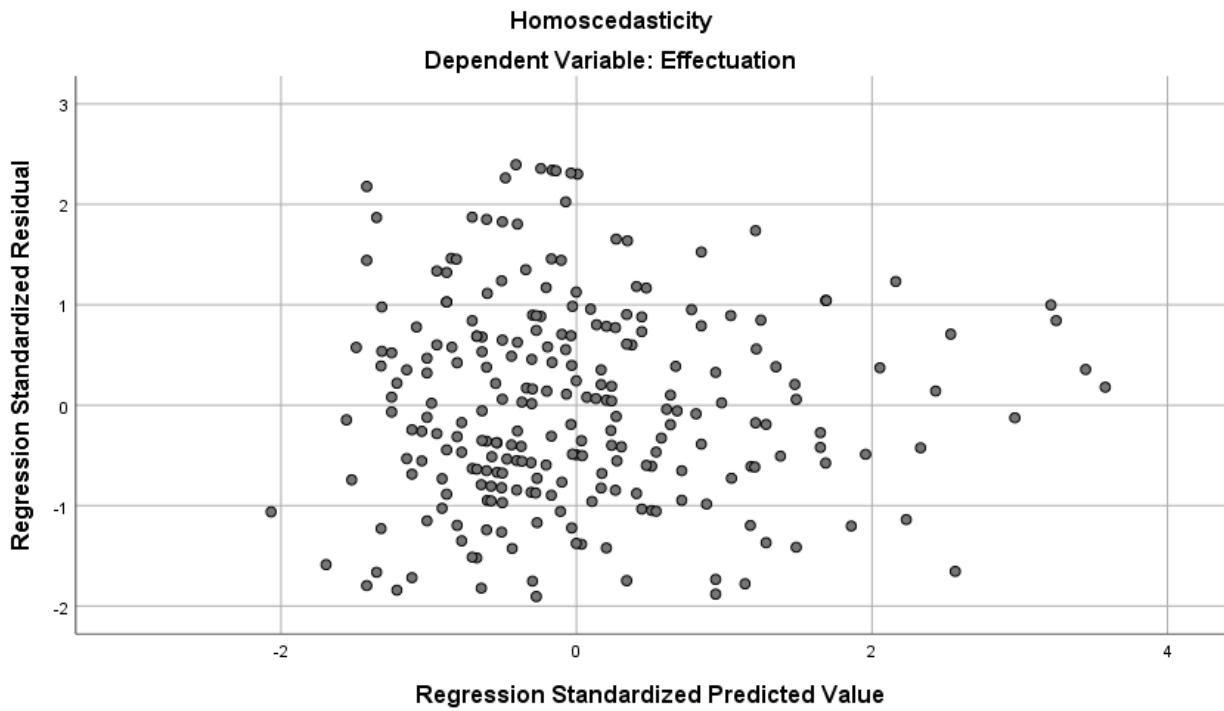


Figure 17
Homoscedasticity, IV: Intolerance of Uncertainty

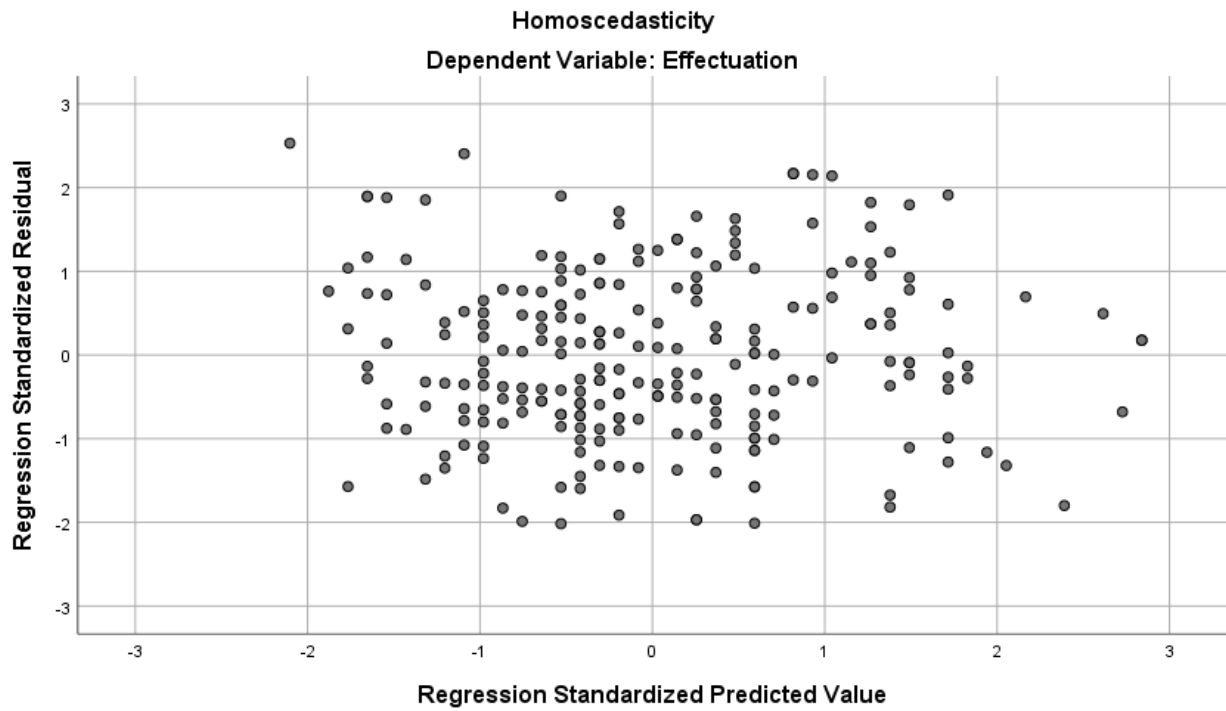


Figure 18
Linearity of the phenomenon, IV: Inhibitory Anxiety

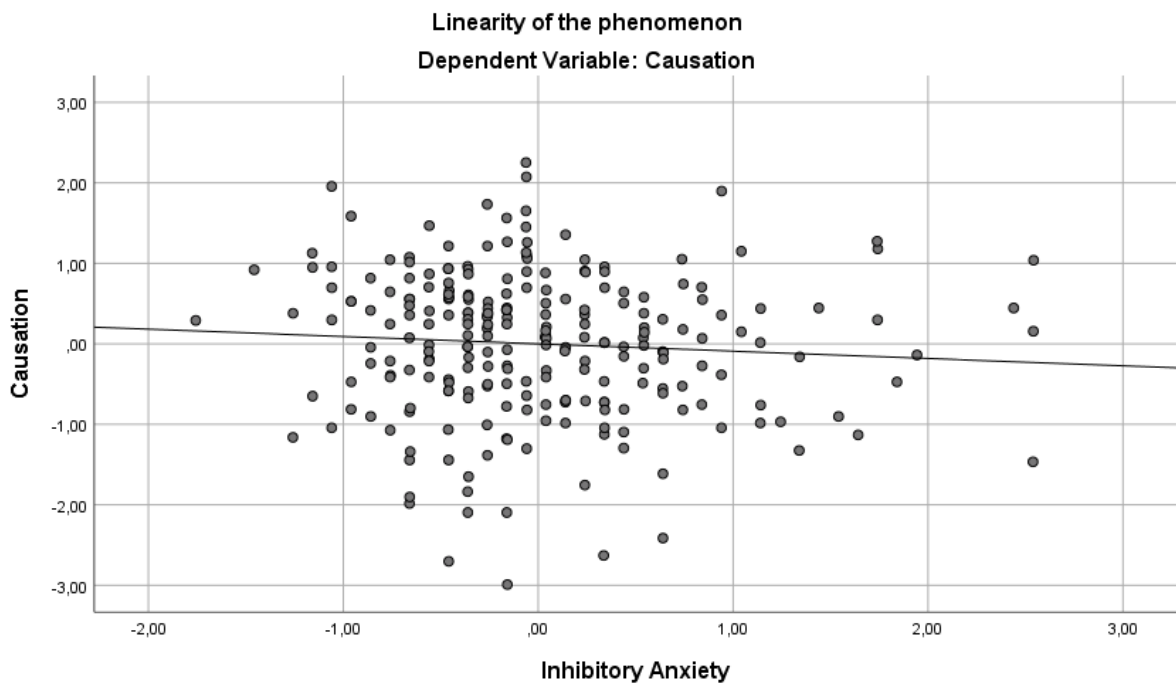


Figure 19

Linearity of the phenomenon, IV: Prospective Anxiety

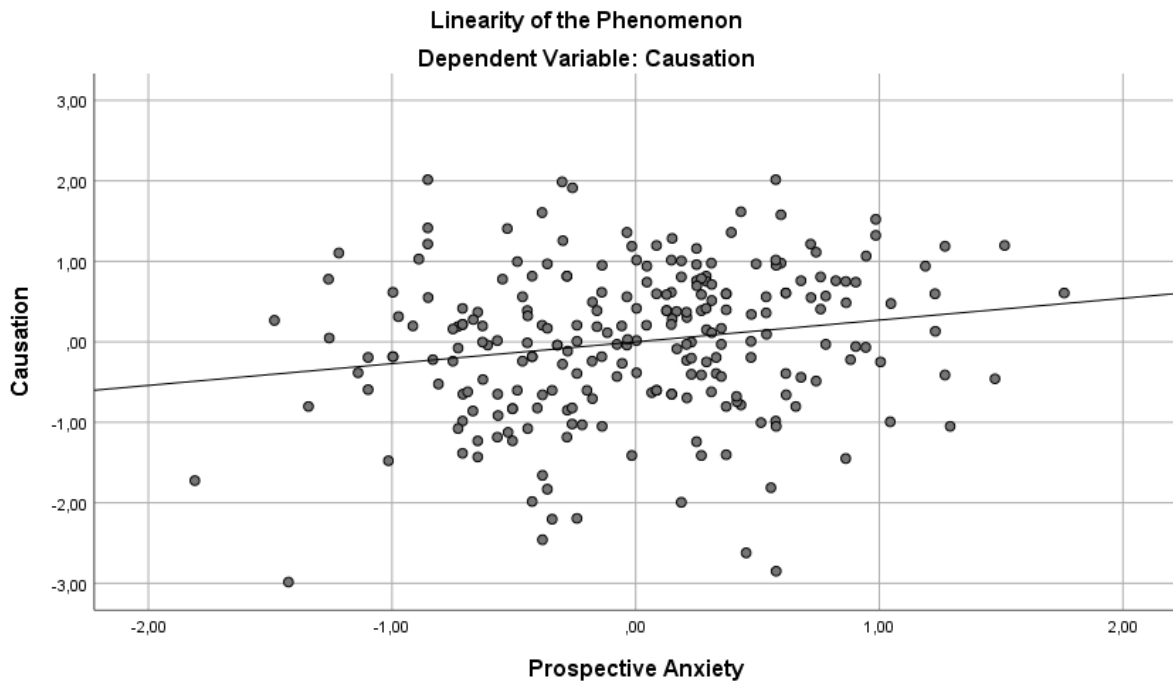


Figure 20

Linearity of the phenomenon, IV: Intolerance of Uncertainty

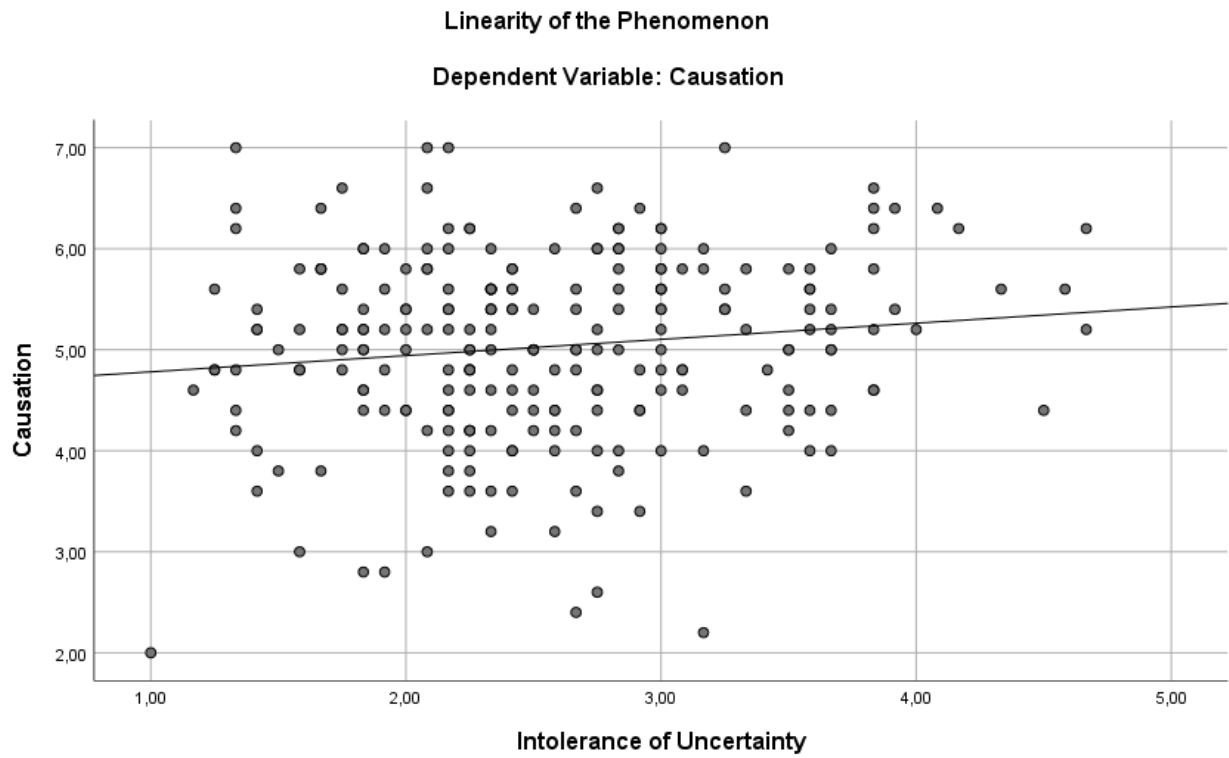


Figure 21

Linearity of the phenomenon, IV: Prospective Anxiety

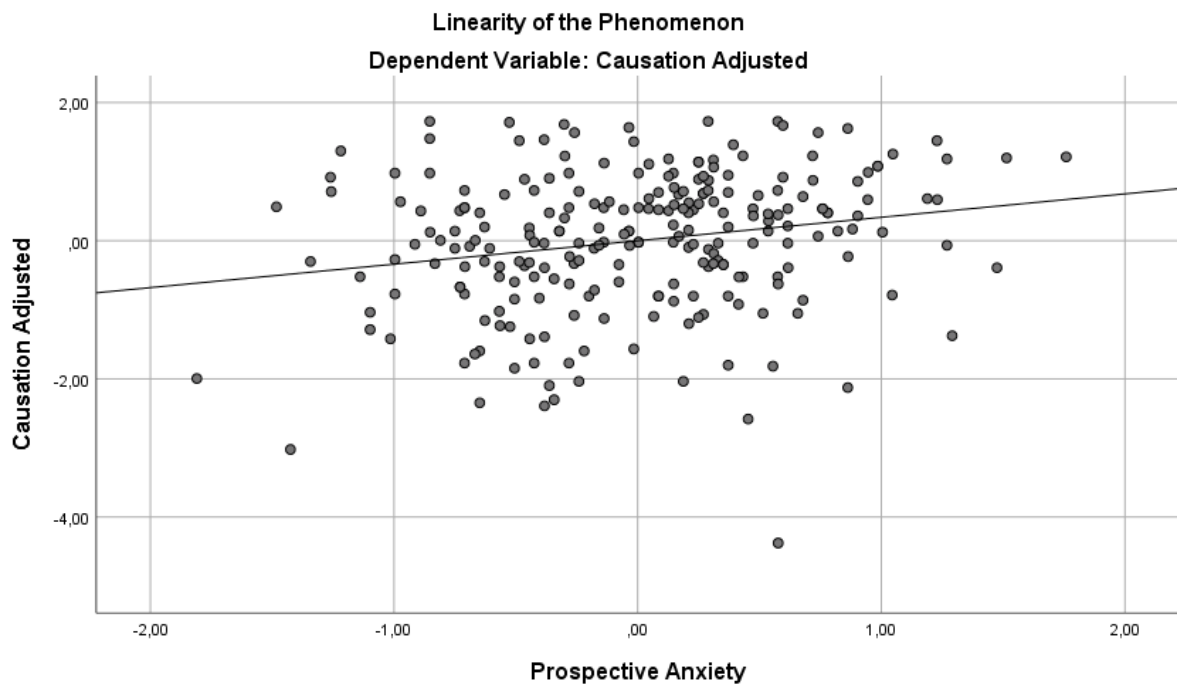


Figure 22

Linearity of the phenomenon, IV: Inhibitory Anxiety

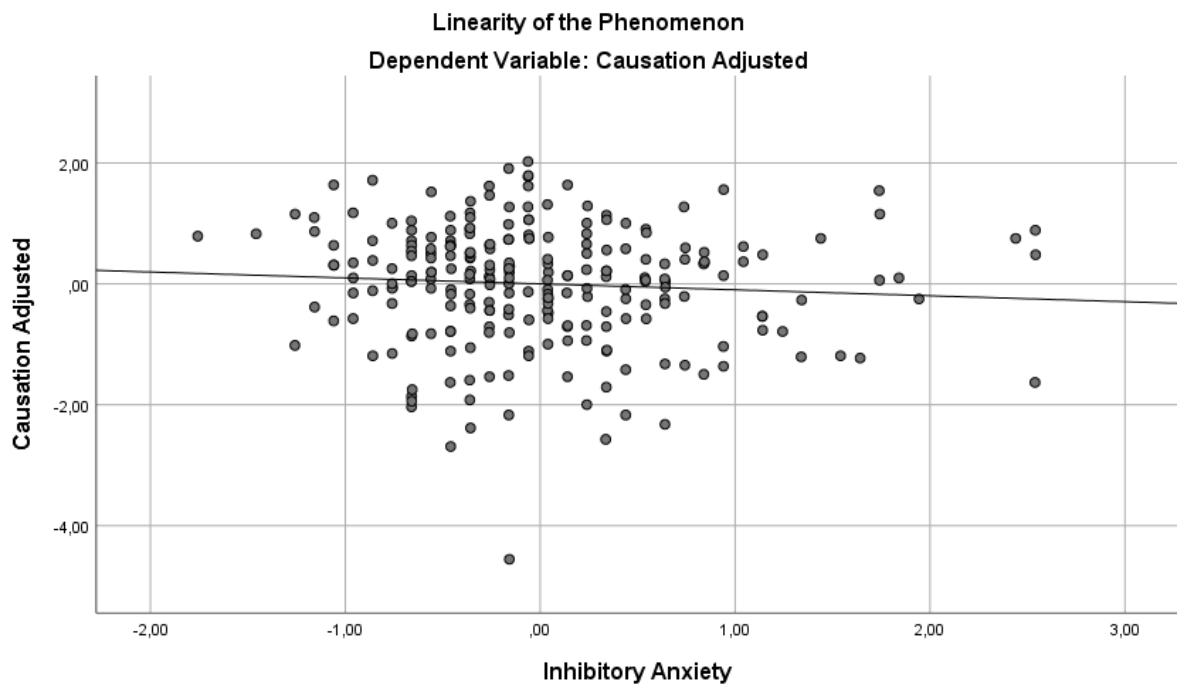


Figure 23
Linearity of the phenomenon, IV: Intolerance of Uncertainty

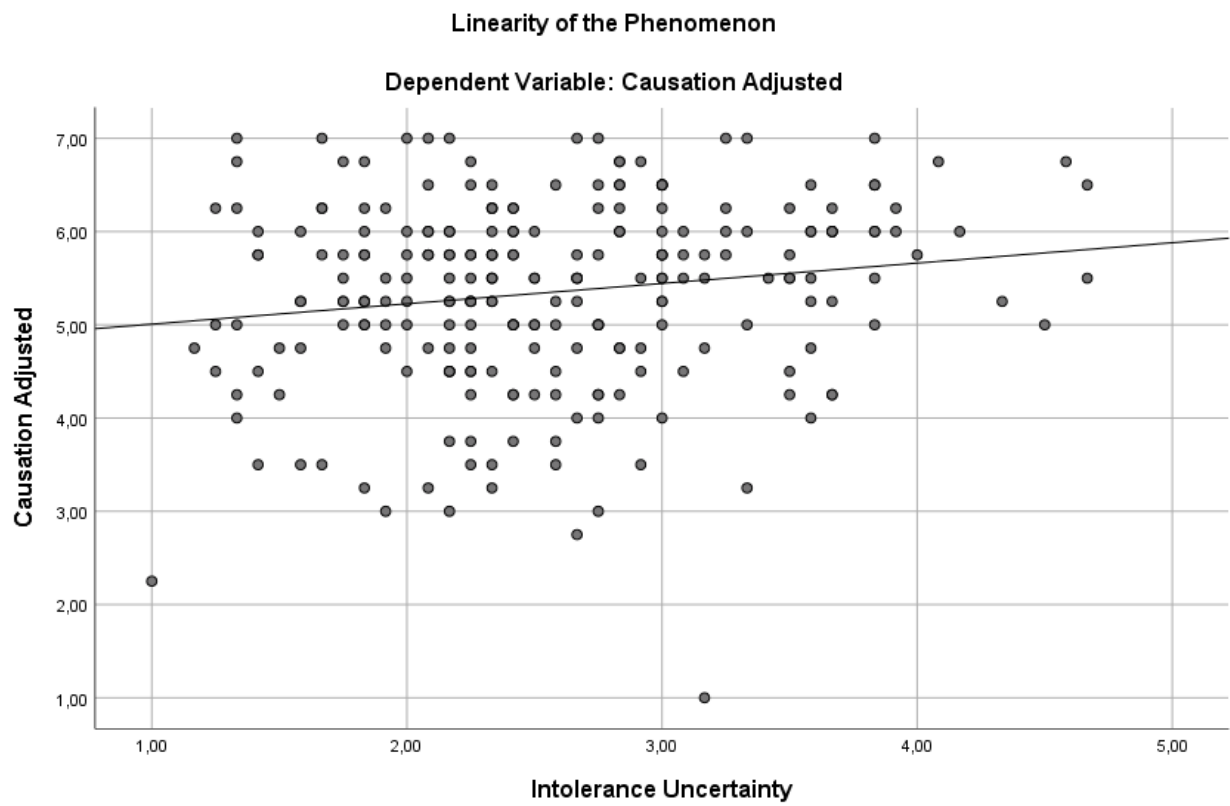


Figure 24
Linearity of the phenomenon, IV: Prospective Anxiety

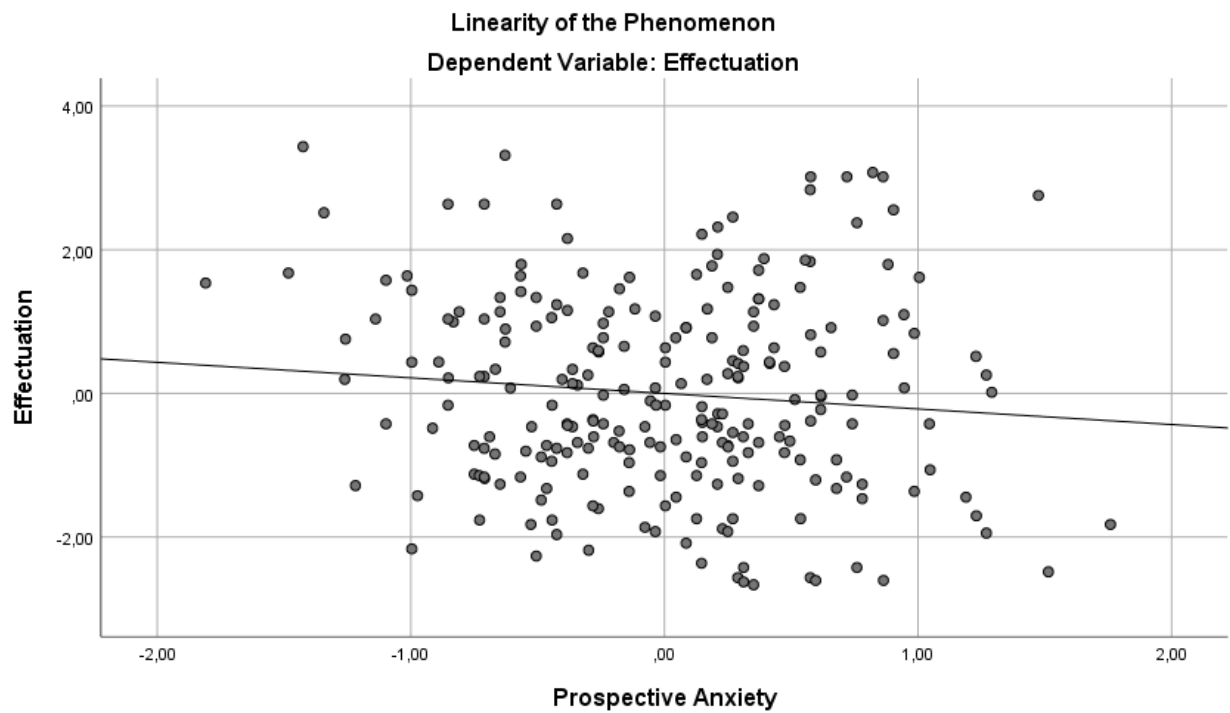


Figure 25

Linearity of the phenomenon, IV: Inhibitory Anxiety

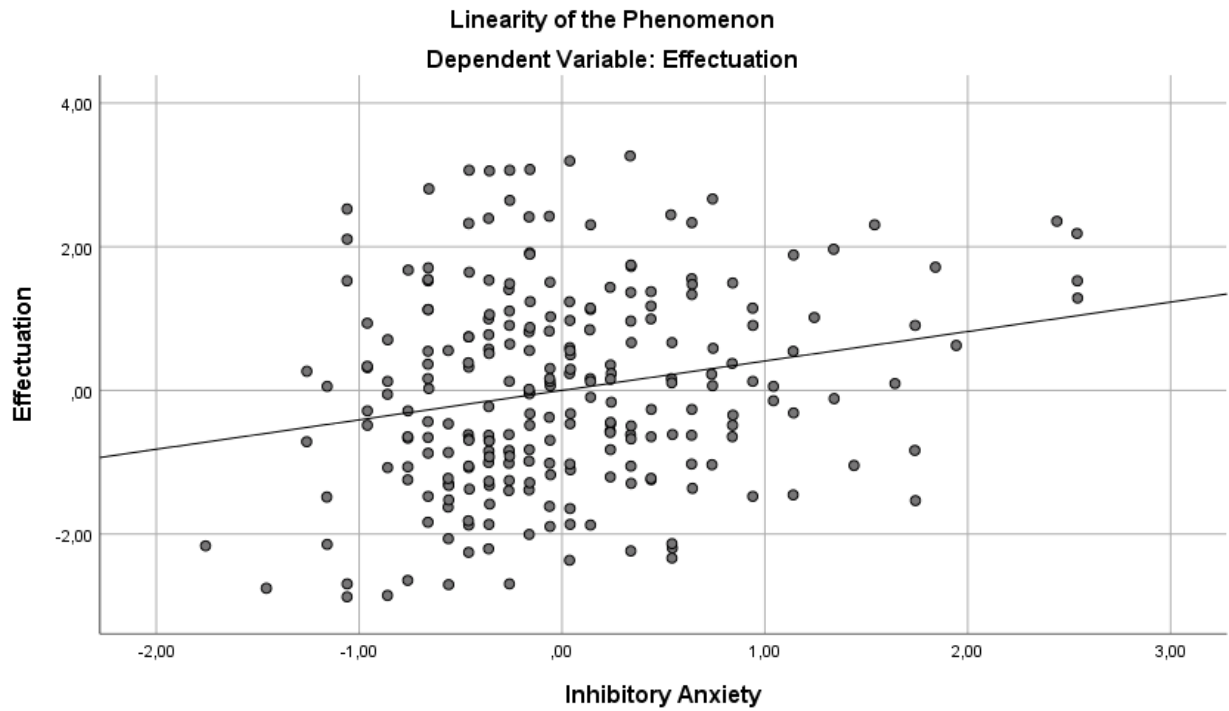
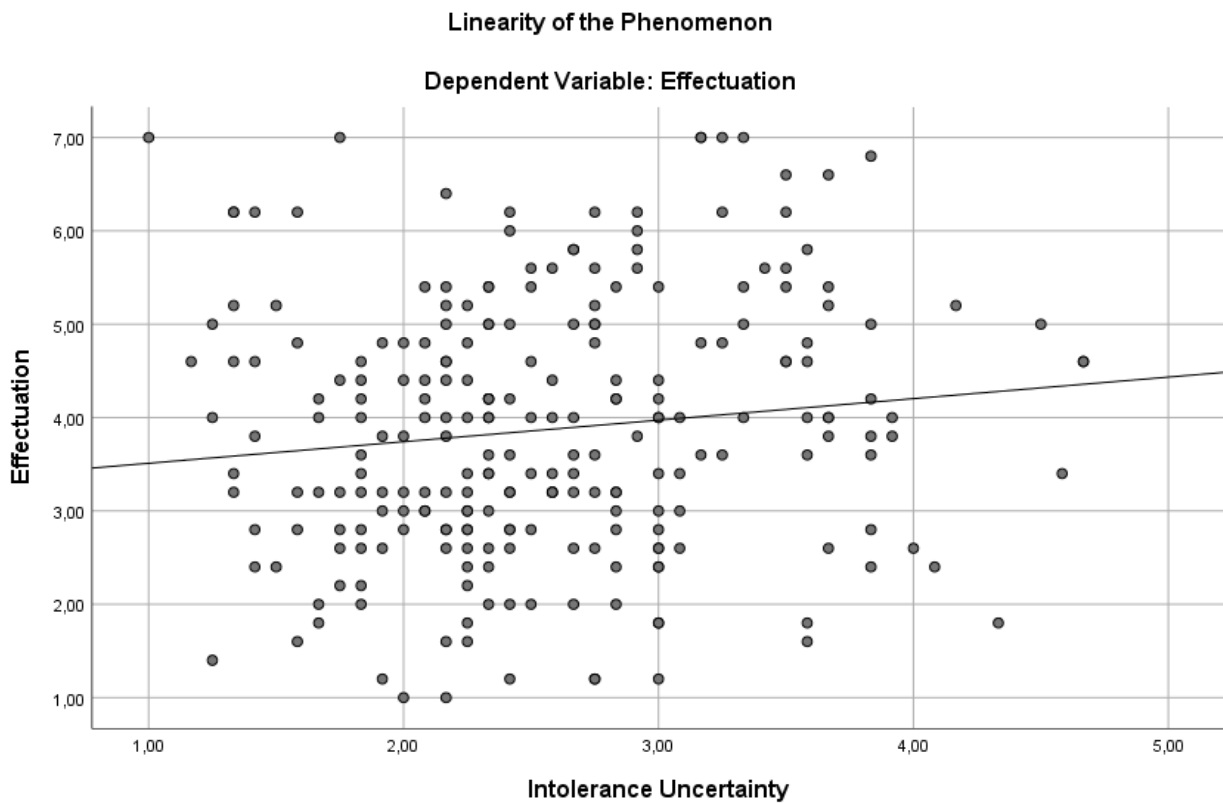


Figure 26

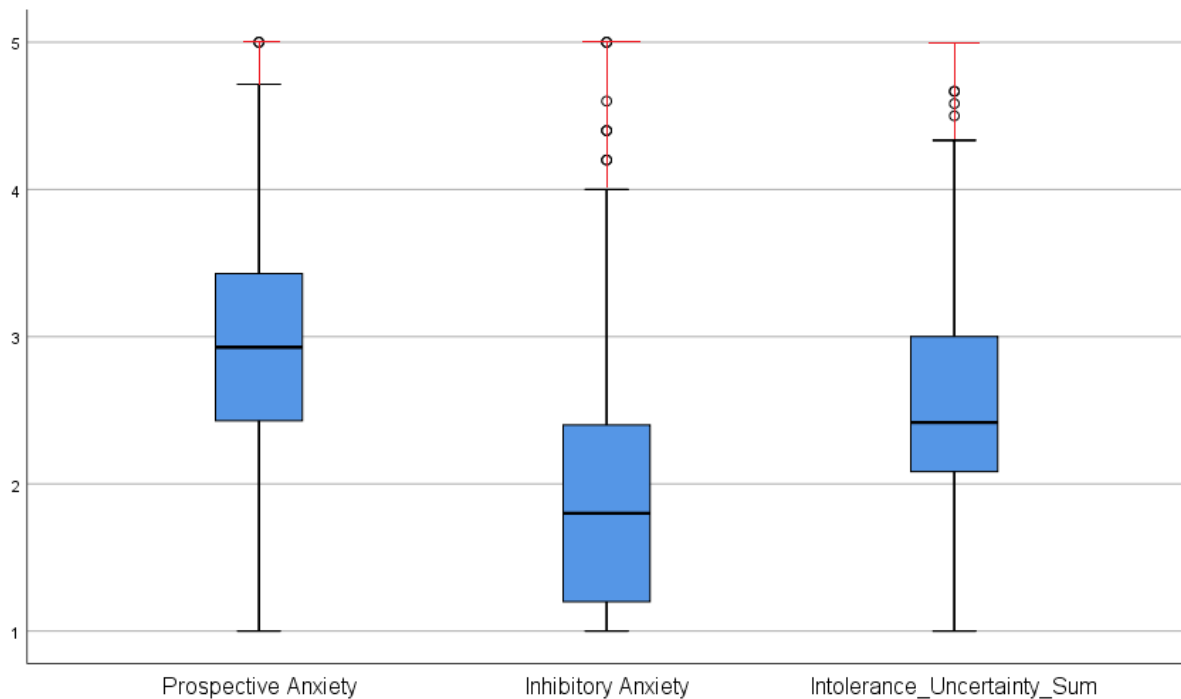
Linearity of the phenomenon, IV: Intolerance of Uncertainty



F. BOXPLOT IDENTIFYING OUTLIERS

Figure 27

Boxplot's showing outliers with regards to MANCOVA. Red whiskers indicate a multiplier of 2.2



G. HIERARCHICAL REGRESSION RESULTS OF CAUSATION ADJUSTED SCALE

Table 19

Results hierarchical regression Dependent Variable: adjusted causation scale

Variable	Dependent Variable: Causation question 3 omitted									
	Model 1		Model 2		Model 3		Model 4		Model 5	
	B	SE	B	SE	B	SE	B	SE	B	SE
Constant	5.29**	.26	4.52**	.36	4.65**	.37	5.29**	.26	4.36**	.37
Gender	.05	.15	.04	.14	-.63	.52	.05	.15	.012	.14
Nationality	-.10	.13	-.12	.13	-.12	.13	-.10	.13	-.13	.13
Degree	.07	.05	.1*	.05	.1*	.05	.07	.05	.10*	.05
Study	.02	.14	-.05	.14	-.05	.14	.02	.14	-.04	.14
Number of Employees	.11*	.05	.12**	.05	.12**	.05	.11*	.05	.11**	.05
Objective	-.33**	.08	-.32**	.08	-.31**	.08	-.33**	.08	-.29**	.08
Intolerance of uncertainty			.27**	.08	.21*	.1				
<i>Intolerance of uncertainty x Female gender</i>					.25	.14				
Inhibitory Anxiety									.00	.09
Prospective Anxiety									.28**	.1
Adjusted R ²	.110		.144		.147		.110		.148	
F	5.988**		5.817**		6.172**		5.988**		6.217**	
Change R ²			.036		.006				.043	
Change F			10.111**		1.784				6.120**	

H. RESULTS STEPWISE REGRESSION

Table 20

Results stepwise regression, DV: Causation

Dependent Variable: Causation									
Variables Entered	Model 1			Model 2			Model 3		
	B	SE	Sig	B	SE	Sig	B	SE	Sig
Constant	5.49	.12	<.001	5.04	.18	<.001	4.462	.29	<.001
Objective	-.31	.07	<.001	-.28	.07	<.001	-.259	.07	<.001
Number of Em- ployees				.136	.04	<.001	.140	.04	.001
Prospective Anxi- ety							.182	.07	.012
Adjusted R ²	.073			.11			.13		
F	19.910			15.883			12.982		
Change R ²				.041			.023		
Change F				11.024			6.456		
Excluded varia- bles (final model only)	Beta in	Sig	VIF						
Gender	-.03	.67	1.05						
Nationality	-.03	.60	1.18						
Degree	.12	.06	1.06						
Study	-.04	.48	1.03						
Inhibitory Anxiety	-0.01	.941	1.62						
Intolerance of Un- certainty	-.01	.941	6.25						
Intolerance of un- certainty x Female gender	-.03	.67	1.05						

Table 21

Results stepwise regression, DV: Causation adjusted scale

Dependent Variable: Causation <i>question 3 omitted</i>												
Variables Entered	Model 1			Model 2			Model 3			Model 4		
	B	SE	Sig	B	SE	Sig	B	SE	Sig	B	SE	Sig
Constant	5.92	.13	<.001	5.21	.27	<.001	4.77	.31	<.001	4.39	.36	<.001
Objective	-.38	.08	<.001	-.36	.08	<.001	-.33	.07	<.001	-.33	.07	<.001
Prospective Anxiety				.23	.08	.004	.24	.08	.003	.27	.08	.001
Number of Employees							.12	.04	.006	.11	.04	.012
Degree										.09	.04	.035
Adjusted R ²	.093			.121			.145			.157		
F	25.787			17.573			14.615			12.248		
Change R ²				.031			.027			.016		
Change F				8.548			.004			7.710		
										.006		
4.504										.035		
Excluded variables (final model only)	Beta in	Sig	VIF									
Gender	.01	.94	1.05									
Nationality	-.07	.27	1.24									
Study	-.03	.68	1.04									
Inhibitory Anxiety	-.002	.983	1.624									
Intolerance of Uncertainty	-.003	.983	6.263									
Intolerance of uncertainty x Female gender	.01	.635	1.05									

Table 22*Results stepwise regression, DV: Effectuation*

Dependent Variable: Effectuation									
Variables Entered	Model 1			Model 2			Model 3		
	B	SE	Sig	B	SE	Sig	B	SE	Sig
Constant	4.7	.21	<.001	4.19	.28	<.001	3.654	.35	<.001
Number of Em- ployees	-.28	.06	<.001	-.25	.06	<.001	-.23	.06	<.001
Objective				.29	.11	.006	.28	.10	.007
Inhibitory Anxiety							.24	.09	.012
Adjusted R ²	.07			.095			.114		
F	19.002		<.001	13.580		<.001	11.371		<.001
Change R ²				.03			.02		
Change F				7.634		.006	6.344		.012
Excluded varia- bles (final model only)	Beta in	Sig	VIF						
Gender	.1	.11	1.032						
Nationality	-.02	.8	1.183						
Degree	-.08	.2	1.039						
Study	.02	.75	1.038						
Intolerance of Un- certainty	-.103	.42	4.326						
Prospective Anxi- ety	-.06	.42	1.604						
Intolerance of un- certainty x Female gender	.1	.11	1.03						