



MSc Clinical Psychology
Department of Psychology

**Worries, Stop-Rules and Problem-Solving
Confidence in a Sample of University Students**

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Foreword

This thesis is submitted in its entirety for partial fulfilment of the requirements of the MSc degree in clinical psychology at Reykjavík University. It is presented in a style of an article to be submitted for publication in a peer-reviewed journal.

This thesis is the compilation of three semesters worth of work at Reykjavík University. A critical literature review of Generalized Anxiety Disorder and the mood-as-input hypothesis was written as preparation for the study on which this thesis is based. During the first semester a research proposal was submitted to the National Bioethics Committee of Iceland for their approval. When the proposal had been approved the preparation for data collection began. Data collection started during the second semester by going between classrooms in Reykjavík University and asking students to participate. Data collection finished during the third semester. In the third semester the data was analysed and an article was written based on the results. This article is now being submitted for review as an MSc thesis. At this current time, the MSc thesis is not a part of a larger research project. However, based on the results of the thesis, a future research project with a new data set is possible. If, in the future, the thesis is to be published as an article, co authors will be my advisors Sævar Már Gústavsson and Jón Friðrik Sigurðsson.

As will be presented in the thesis there are a few available theories that set forth an theoretical model explaining Generalized Anxiety Disorder. The mood-as-input hypothesis is less recognized compared to other theories in the field. The mood-as-input hypothesis is based on mood acting as a guide for decision making. During my studies I always wondered why Generalized Anxiety Disorder had many different types of models and theories trying to explain the maintenance of the disorder when many other anxiety disorders such as Panic disorder and Social Anxiety have a simple, well defined model. Generalized Anxiety Disorder is, to me, one of the more fascinating anxiety disorders. Generalized Anxiety Disorder revolves around

worrying about everything and everyone while simultaneously trying to avoid terrible things from happening. Being constantly on edge due to worries is debilitating in a way that most people probably do not comprehend unless they have experienced it in some way. This thesis is my attempt to trying to add to the knowledge base of Generalized Anxiety Disorder and more importantly the effect that worries can have on daily life.

First, I would like to thank my advisors Sævar Már Gústavsson and Jón Friðrik Sigurðsson for their assistance and valued advise in the making of this thesis. I have many people around me who have supported me, not only during the construction of this thesis but also throughout my studies at Reykjavík University. Primarily, I would like to thank my family for their support. To my parents, Bryndís and Carsten, for their encouragement, willingness to listen and helping me along the way. To my sister, Elín, for always knowing the right thing to say and never failing to make me laugh when I needed it.

Abstract

Aims: The mood-as-input hypothesis has been found to be successful in predicting worry and peoples' perceived ability to solve problems. The purpose of this study was to examine the relationship between stop-rules, worries, intolerance of uncertainty and problem-solving.

Method: Two-hundred and thirty-one university students, 172 females and 57 males, answered the Generalized Anxiety Disorder-7, the Patient Health Questionnaire-9, the Problem-Solving Confidence sub-scale, the Worry Stop-Rules Questionnaire, the Penn State Worry Questionnaire, The Worry Behaviour Inventory, the Intolerance of Uncertainty scale and the Dysfunctional Attitudes scale in class or online. Age ranged between 20 and 56 years.

Results: There was a significant correlational relationship between the participants' scores on all the questionnaires used in the study. Those with higher level of worry scored significantly higher on all questionnaires. The "As many as can" stop-rule added a unique variance in hierarchical multiple linear regression analysis predicting scores of pathological worry. Mediation analysis found both stop-rules and problem-solving confidence to mediate intolerance of uncertainty and worry.

Conclusion: Low problem-solving confidence and the mood-as-input hypothesis significantly contribute to the understanding of Generalized Anxiety Disorder but needs further research.

Keywords: Generalized Anxiety Disorder, the mood-as-input hypothesis, worry, intolerance of uncertainty and problem-solving

Worries, Stop-Rules, and Problem-Solving Confidence in a Sample of University Students

To worry is a cognitive process that we all share. Worries can vary in severity and scope, from worrying about minute things in our daily life to worrying about our loved ones and the future. However, while a reasonable and normal cognitive process, worrying can start to take over as the worries increase in extent and have negative effects on daily functioning. At that point worrying has become pathological. When the magnitude and intensity of worries become pathological, individuals can be diagnosed with Generalized Anxiety Disorder (GAD). GAD is primarily characterized by extensive and pathological worries which the individual finds difficult to control (American Psychiatric Association, 2013). Many theories and models have been developed to describe GAD, and more specifically, how pathological worries are maintained (for review, see Behar, Alcaine, Zuellig & Borkovec, 2009). The most notable of these is the Intolerance of Uncertainty Model (IU) (Buhr & Dugas, 2009; Dugas Letarte, Rhéaume, Freeston & Ladouceur, 1995; Robichaud & Dugas, 2005). Intolerance of uncertainty refers to the tendency to view uncertainty in a negative light and thus react negatively to events or circumstances that are inherently uncertain (Buhr & Dugas, 2009). However, one of the models trying to explain GAD and worries is the mood-as-input (MAI) hypothesis of perseverative worry (Meeten & Davey, 2011). The MAI hypothesis refers to the notion of how individuals use emotions or mood to determine if a task has been completed or not. The MAI hypothesis describes specific decision-making rules, hereafter referred to as stop-rules. These stop-rules influence how decisions are made, based on available information. The stop-rules can either make us persist with a task or make us stop (Meeten & Davey, 2011). Furthermore, mood and stop-rules have been found to predict pathological worries (Davey, Jubb & Cameron 1996). However, the MAI hypothesis has received less attention in the literature, compared to e.g. the

IU. The MAI hypothesis has received less attention in the literature compared to other theoretical models e.g. the IU Model, due to the lack of research using the MAI hypothesis with clinical samples (Behar et al., 2009).

Generalized Anxiety Disorder Order as a Diagnosis

Diagnostic criteria for GAD according to DSM-5 is excessive anxiety and worry occurring most of the time (counted in days) over the span of at least a six-month period. The worry and anxiety must be about several activities, people or events occurring in the individual's life. Furthermore, the individual must experience difficulty to control the worry (American Psychiatric Association, 2013, p. 222). These two diagnostic features, experiencing pathological worry and having trouble controlling them, must be in place for a diagnosis of GAD to be made. Worrying has been defined by many. Borkovec, Alcaine & Behar (1983) define worrying as "a chain of thoughts and images, negatively affect laden and relatively uncontrollable" and that definition will be used for the purposes of this study. Worries become pathological when they turn excessive and distressing but also feel uncontrollable (Hirsch & Mathews, 2012). These worries are often represented in the form of "What if" questions: "What if something happens to my child?", "What if something goes wrong with my presentation at work?" and "What if I forget to return this to my friend?" These "What if" questions bring on more thoughts related to the previous one. For example, the initial thought could be "What if my child gets hurt?" which could then turn into "What if my child gets hurt and I'm not there?". These worries grow from the previous one and a worry spiral can start to form. Furthermore, for worrying to be considered pathological or excessive, the individual must experience at least three additional symptoms, such as concentration problems, restlessness or difficulty sleeping (American Psychiatric Association, 2013). Worry frequency has been linked with the use of stop-rules. In addition, worry frequency, or how much an individual worries, was found to be significantly connected to

the use of stop-rules (Davey, Startup, MacDonald, Jenkins & Patterson, 2005). High frequency worriers have been found to stay with a worry episode for significantly longer than with those that did not worry as much (Startup & Davey, 2001).

According to the MAI hypothesis, mood functions as a barometer in determining if a task or a goal has been completed or if it should be terminated (Davey, Startup, Zara, MacDonald & Field, 2003; Martin & Davies, 1998; Meeten & Davey, 2011). The MAI hypothesis stipulates that mood or emotion is an imperative element by which the individual judges if the goal has been completed or if it should be abandoned. How the individual does this is by using stop-rules. The stop-rules are used to determine certain goals, for example how often one has to check a text for spelling mistakes or as they pertain to the specific task at hand (Dash, Meeten, Jones & Davey, 2015). Stop-rules can either refer to the notion that a task should be finished as thoroughly and extensively as possible or doing what feels enough. The stop-rules are therefore two; “As many as can” and “Feel like continuing”. The “As many as can” rule refers to doing as much as the individual can do in that moment, regardless of how they feel. The “Feel like continuing” rule refers to doing as much as the individual feels like doing in the moment based on their mood (Davey et al., 2005). A study by Martin, Ward, Achee & Wyer, (1993) found that participants that had been induced with negative mood, generated fewer items on an item generation task using the “As many as can” rule compared to those who hadn’t been induced with negative mood. When the “Feel like continuing” rule was implemented those in a positive mood generated more items than those in a negative mood. Moreover, the study found that those who were in a negative mood were more likely to stop generating items when using the “Feel like continuing” rule compared to those in a positive mood. Those in a negative mood were more likely to persist generating items when using the “As many as can” rule. In addition, Startup and

Davey (2001) found that when induced to a negative mood there was a significantly higher rating of negative affect and lower rating of happiness post mood induction. Furthermore the “As many as can” rule has been found to be positively correlated with many worry related constructs (Davey et al., 2005) such as trait worry as measured by the Penn State Worry Questionnaire (PSWQ) (Meyer, Miller, Metzger & Borkovec, 1990). This demonstrates that mood, whether it is negative or positive, in conjunction with stop-rules, affects behaviour.

The Cognitive Theory of Anxiety Disorders and the MAI Hypothesis

As has been stated, MAI refers to the notion of using mood as a signal to decide if a task should be completed or not. The cognitive theory of anxiety disorders (CT) (Beck, Emery & Greenberg, 1985; Clark & Beck, 2011) states that when an individual appraises a situation in a negative way he or she will experience negative mood. According to CT, when people experience anxiety, it is triggered by a situation where they perceive themselves to be under threat, either socially or physically. The anxious thought or appraisal can either be or stem from an exaggerated and/or dysfunctional belief about oneself, others, or the future. CT furthermore states that there is a primary and secondary level of appraisal and that, depending on the balance between the two, indicates the intensity of an anxious state. The primary appraisal involves the probability of harm and the perceived severity because of that harm. The secondary appraisal happens after the primary appraisal and can magnify the original perception of threat, but the secondary appraisal refers to the perceived ability to cope with the threat and feeling of safety (Beck et al., 1985). An individual with dysfunctional attitudes and feeling inadequate at managing his or her problems in daily life should be more likely to experience negative mood compared to an individual who does not have dysfunctional attitudes and feelings of inadequacy. As mentioned before, when experiencing a negative mood, an individual is more likely to stop doing a task and is less likely to persist at that task (Martin et al., 1993). This understanding can

both be applied to the persistence of pathological worry in GAD but also to the MAI hypothesis and the use of stop-rules. An individual with dysfunctional attitudes, low intolerance of uncertainty or GAD diagnosis is, hypothetically, more likely to decide to terminate a task if he is in a negative mood. This can have a vast effect on daily functioning and persist with finishing tasks. The MAI hypothesis and stop-rules, have been found to be successful in predicting worry and people's perceived ability to solve problems (Davey, 1994). There is an indication for efficacy where the MAI hypothesis is used as a foundation for low intensity treatment for people in a non-clinical sample (Dash et al., 2015). It is therefore proposed that using the principles of the MAI hypothesis and the cognitive theory of anxiety disorders together can be valuable to understand pathological worry and GAD.

Conclusion and Proposed Research

In this thesis, the relationship between the MAI hypothesis, worries, intolerance of uncertainty and problem-solving will be explored. The proposed hypotheses are as follows: 1) There is a significant positive correlation between all measures used in the study, 2) Students categorised as "high worriers" will have higher scores on questionnaires measuring stop-rules and problem-solving confidence compared to students classed as "low worriers", 3) Problem-solving confidence and stop-rules will increase explained variance in a hierarchical regression analysis when measures of anxiety, depression, IU and dysfunctional attitudes have been accounted for, and 4) The relationship between intolerance of uncertainty and worry is mediated by stop-rules and problem-solving confidence.

Method

Participants

Participants were 231 university students at Reykjavík University in Iceland. Age ranged from 20 to 56 years, mean age = 26.85 ($SD = 6.3$). Participants were 74.5% female ($n = 172$) and 24.7% male ($n = 57$). Two students did not report their gender. Inclusion criteria was 1) Being 18 years old or older and 2) Ability to read and understand Icelandic.

Measures

The Generalized Anxiety Disorder-7 (Spitzer, Kroenke, Williams & Löwe, 2006) is a seven-item self-report questionnaire which purports to measure symptoms of generalized anxiety for the last two weeks. The psychometric properties of the original scale and the Icelandic version have been found good (Snæbjörnsdóttir, 2018; Spitzer, Kroenke, Williams & Löwe, 2006).

The Patient Health Questionnaire-9 (PHQ-9) (Kroenke, Spitzer & Williams, 2001) is a questionnaire designed to assess symptoms of major depressive disorder (MDD). It is comprised of nine questions that ask about depressive symptoms in the last two weeks. Psychometric properties of the Icelandic version of PHQ-9 have been found good in a non-clinical sample (Jónsdóttir & Sigurðardóttir, 2016) and for university students (Snæbjörnsdóttir, 2018; Eysteinnsson, 2019).

The Problem-Solving Confidence subscale (PSC) (Heppner & Petersen, 1982) is a subscale of the Problem-Solving Inventory. The PSC assess how people trust their belief or how self-assured they are about their own ability to cope with a wide array of problems (Heppner, Witty & Dixon, 2004). A higher score indicates a more negative attitude towards their own

ability to solve problems. Internal reliability for the PSC has been found to be good (Heppner et al., 2004), but the psychometric properties of the Icelandic translation has not been evaluated.

The Worry Stop-Rules Questionnaire (WSRQ) (Davey et al., 2005) is a 19-item self-report measure used to evaluate worry stop-rules that are hypothesized to be involved in the perseveration of pathological worry. WSRQ differentiates between two types of stop-rules that are measured with two subscales. They are divided into “As many as can” (AMA) rule and “Feel like continuing” rule (FL). Internal reliability for both subscales has been found good (Davey et al., 2005). The WSRQ has not been used or tested for psychometric properties in Iceland prior to this study.

The Penn State Worry Questionnaire (PSWQ) (Meyer et al., 1990) evaluates people’s tendency to worry. A higher score on the PSWQ suggests a higher tendency to worry. PSWQ has been frequently used as a measure for GAD symptoms because it primarily measures worry (Davey et al., 2005; Hanrahan, Field, Jones & Davey, 2013; Vijay, Avasthi & Grover, 2014). Psychometric properties of the PSWQ has been measured excellent (Þorgilsdóttir & Stefánsdóttir, 2017).

The Worry Behaviour Inventory (WBI) (Mahoney et al., 2016) is used to measure maladaptive behaviour related to worry such as reassurance seeking, avoidance or attempting to control worries. A higher score on the WBI suggests the behaviour connected to worry is having a negative impact in daily life (Mahoney et al., 2016). Validity and internal reliability of the WBI have been found good in both English and Icelandic (Sigurðardóttir, 2019; Mahoney et al., 2016).

The Intolerance of Uncertainty Scale (IUS) (Carleton, Norton & Asmundsson, 2007) is a self-report measure of how individuals manage uncertainty in daily life. The IUS is

comprised of 27 statements where individuals evaluate how descriptive the statement is of their attitude towards uncertainty. In this study the shortened version of the IUS is used. In Iceland, the psychometric properties of the long version have been evaluated and measured excellent but the short version has not been evaluated. (Þorgilsdóttir & Stefánsdóttir, 2017).

The Dysfunctional Attitudes Scale (DAS) (Weissman and Beck, 1978) is a questionnaire used to assess dysfunctional attitudes that are common in depression. The DAS has 40 questions (DAS-40). For the purposes of this study the shortened version of DAS is used. A higher score indicates a higher level of dysfunctional attitudes (de Graaf, Roelofs & Huibers, 2009). Psychometric properties of the DAS-17 have not been assessed in Icelandic, but internal reliability and validity for the English version has been assessed with good results (de Graaf et al., 2009).

Procedure

This study was approved by The National Bioethics Committee of Iceland (NCBI) (VSN-19-113) and Reykjavík University. The study was conducted at Reykjavík University. When ethical approval had been given, the researcher visited a classroom. At the end of the class the students were invited to participate in the study. They were then provided with an information sheet about the study, as well as the self-report measures. Informed consent was inferred by participation, i.e. if the student answered the self-report measure and turned it over to the researchers, they had given an informed consent to participate. The students were encouraged to ask questions if they needed any clarification. When the students had finished answering all the questions, they handed their responses to the researcher and subsequently finished their participation in the study. Due to the Coronavirus lockdown it was decided to also send out an electronic version of the questionnaire via Questionpro. Prior to beginning answering the

questionnaires online students were asked if they had participated in the study before to screen out those who had already answered.

Statistical Analysis

The Statistical Package for the Social Sciences (SPSS) was used to analyse the data. Missing data was addressed using pairwise deletion since it was below 5% for all questionnaires. Testing the normality of the data, skew and kurtosis analysis based on guidelines by Kim (2013) revealed that GAD-7, PHQ-9 and PSC were not normally distributed. All other measures had a normal distribution. Cronbach's alpha was above .83 for all measures and internal consistency thus acceptable. Pearson's correlation was used to examine the correlational relationship between measures. The difference in total scores between those with high propensity to worry and those who did not was calculated with an independent samples t-test. The sample was divided into two groups based on scores on the PSWQ. A score of 62 was used as a cut-off (Behar et al., 2003). Those who scored higher than 62 were grouped into a "high worry" (HW) group and those with 61 or less into a "low worry" (LW) group. The question of whether worry behaviour and problem-solving confidence would add to the unique variance of GAD was assessed with a hierarchical multiple linear regression. The total scores of the questionnaires were entered into the model in the following order: GAD-7 and PHQ-9 as step 1, DAS-17 and IUS-12 as step 2, AMA as step 3 and PSC as step 4. To explore whether the relationship between worry and dysfunctional attitudes is mediated by problem-solving confidence and stop-rules, respectively, a generic mediation analysis was used. In the mediation analysis the confidence interval (CI) was bootstrapped with 1000 samples (Field, 2017).

Results

Hypothesis I:

Correlations between measures are presented in Table 1. As expected, there was a positive correlation between all measures except for the "Feel like continuing" stop-rule (FL) which was negatively correlated with the other measures. Hypothesis I is thus confirmed except for "Feel like continuing" stop-rule (FL). Notably, the total scores for worry behaviour (WBI), worry (PSWQ) and intolerance of uncertainty (IUS-12), respectively, had a high positive correlation with the "As much as can" stop-rule (AMA). Furthermore, intolerance of uncertainty (IUS-12) had a high positive correlation with worry behaviour (WBI).

Table 1

Summary of Intercorrelations, Means, Standard Deviations and Cronbach's Alpha of Measures

	<i>M (SD)</i>	<i>α</i>	GAD-7	PHQ-9	PSC	AMA	FL	PSWQ	WBI	IUS-12	DAS-17
GAD-7	6.81 (4.31)	.87	1	.669**	.368**	.433**	-.260**	.532**	.435**	.509**	.286**
PHQ-9	7.20 (5.09)	.86		1	.416**	.381**	-.269**	.400**	.422**	.489**	.450**
PSC	28.76 (7.90)	.84			1	.309**	-.279**	.355**	.301**	.344**	.394**
AMA	26.78 (8.79)	.91				1	-.364**	.593**	.685**	.648**	.415**
FL	25.80 (7.63)	.90					1	-.342**	-.273**	-.365**	-.250**
PSWQ	47.01 (11.76)	.84						1	.531**	.626**	.403**
WBI	18.72 (7.87)	.87							1	.727**	.469**
IUS-12	29.46 (11.57)	.94								1	.463**
DAS-17	51.26 (19.10)	.93									1

Note. ** Correlation is significant at $p < .001$, * correlation is significant at $p < .05$.

GAD-7 = Generalized Anxiety Disorder 7, PHQ-9 = Patient Health Questionnaire-9, PSC = Problem Solving Confidence, a subscale of the Problem Solving Inventory, AMA = "As many as can" a subscale of WSRQ, FL = "Feel like continuing" a subscale of WSRQ, PSWQ = Penn State Worry Questionnaire, WBI = Worry Behavior Inventory, IUS-12 = Intolerance of Uncertainty Scale - short version, DAS = Dysfunctional Attitudes Scale - short version.

Hypothesis II:

Table 2 displays comparison between the “high worry” and “low worry” groups on all measures.

As predicted, the “high worry” was on average higher than the “low worry” apart from the “Feel like continuing” stop-rule (FL) where the scores were reversed. There was a significant difference between the “high worry” and the “low worry” groups on all questionnaires.

Table 2

Comparison Between Worry Groups on All Questionnaires.

	Low level of worry (n = 28)	High level of worry (n = 196)	<i>t</i>	95% CI	
	<i>M (SD)</i>	<i>M (SD)</i>		<i>LL</i>	<i>UL</i>
GAD-7	6.21 (3.90)	10.61 (4.99)	5.38**	2.79	6.01
PHQ-9	6.64 (4.84)	10.29 (5.63)	3.65**	1.67	5.61
PSC	28.30 (7.67)	32.14 (9.09)	2.42*	0.71	6.98
AMA	25.32 (7.87)	36.96 (7.89)	7.31**	8.50	14.78
FL	26.66 (7.32)	19.86 (7.41)	-4.59**	-9.73	-3.88
WBI	17.74 (7.35)	26.00 (8.29)	5.30**	5.19	11.33
IUS-12	27.42 (10.52)	43.04 (9.07)	7.45**	11.49	19.75
DAS-17	48.74 (17.93)	67.71 (16.37)	5.28**	11.88	26.06

Note. CI = Confidence interval, LL = lower limit, UL = Upper limit. High worry group includes participants that scored 62 or over on PSWQ. Low worry group includes participants scoring lower than 62. GAD-7 = Generalized Anxiety Disorder 7, PHQ-9 = Patient Health Questionnaire-9, PSC = Problem Solving Confidence, a subscale of the Problem Solving Inventory, AMA = "As many as can" a WSRQ subscale, FL = "Feel like continuing" a WSRQ subscale, PSWQ = Penn State Worry Questionnaire, WBI = Worry Behavior Inventory, IUS-12 = Intolerance of Uncertainty Scale short version and DAS = Dysfunctional Attitudes Scale - short version. ** Correlation is significant at $p < .001$, * correlation is significant at $p < .05$.

Hypothesis III:

The results from a hierarchical multiple regression can be found in Table 3. The results show that the total score on GAD symptoms (GAD-7) and depressive symptoms (PHQ-9) account for 40.1% of the variance of worry (PSWQ). With the addition of the dysfunctional attitudes (DAS-17) and intolerance of uncertainty (IUS-12) there is an increase in explained variance by 17.8%.

The “As much as can” stop-rule (AMA) adds 1.1% to the explained variance and problem-solving confidence (PSC) adds 0.4% to the variance. Notably, dysfunctional attitudes (DAS-17) did not add to the to the model.

Table 3

Hierarchical Multiple Regression Analysis Predicting Worry Scores as Measured with the PSWQ (N=204).

	ΔR^2	<i>B</i>	SE (<i>B</i>)	β
<i>Step 1</i>				
GAD-7		1.055	.209	.307**
PHQ-9		0.781	.177	.324**
<i>Step 2</i>				
	.178**			
GAD-7		0.537	.186	.188*
PHQ-9		0.424	.161	.176*
DAS-17		0.012	.035	.019
IUS-12		0.540	.063	.509**
<i>Step 3</i>				
	.011*			
GAD-7		0.497	.185	.174*
PHQ-9		0.432	.159	.179*
DAS-17		0.01	.035	.001
IUS-12		0.455	.073	.429**
AMA		0.200	.088	.142*
<i>Step 4</i>				
	.004			
GAD-7		0.463	.186	.162*
PHQ-9		0.401	.160	.166*
DAS-17		-0.010	.036	-.15
IUS-12		0.461	.073	.435**
AMA		0.196	.087	.139*
PSC		0.111	.080	.070

Note. ** $p < .000$, * $p < .05$. Total $R^2 = .401$ **

Hypothesis IV:

As hypothesized and presented in Figure 1, there was a significant indirect effect of intolerance of uncertainty (IUS-12) on worry (PSWQ) through the “As much as can” stop-rule (AMA), $b =$

0.570, 95% CI [0.018 0.009]. As reported in Figure 2, there was a significant indirect effect of intolerance of uncertainty (IUS-12) on worry (PSWQ) through the “Feel like continuing” stop-rule (FL) $b = 0.050$, 95% CI [0.000 0.108]. The indirect effect for intolerance of uncertainty (IUS-12) and worry (PSWQ) via problem-solving confidence (PSC) was significant $b = 0.226$, 95% CI [0.122 0.355] (see figure 3). The “As much as can” stop-rule (AMA), the “Feel like continuing” stop-rule (FL) and problem-solving confidence (PSC) all mediate the relationship between intolerance of uncertainty (IUS-12) and worry (PSWQ).

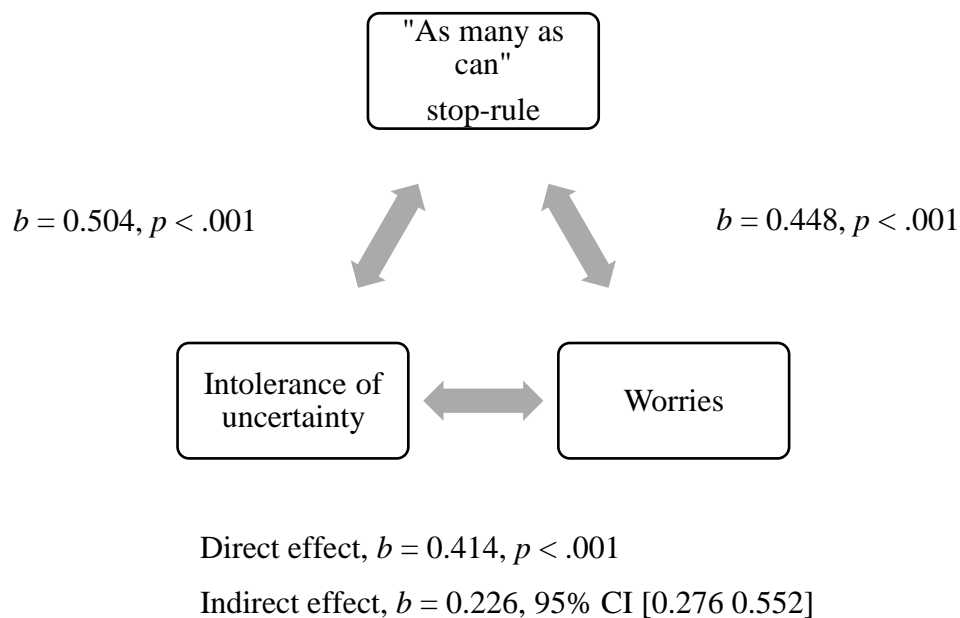


Figure 1. Generic mediation model of intolerance of uncertainty (IUS-12) and worries (PSWQ) through "As many as can" stop rule (AMA).

The stop-rules and problem-solving confidence significantly mediate the relationship between intolerance of uncertainty and worry. As presented in Figure 2 the mediation effect for the “Feel like continuing” stop-rule is almost not significant. Compared to the “As much as can” stop-rule and problem-solving confidence the “Feel like continuing” stop-rule has a negative relationship with intolerance of uncertainty and worries while the others have a positive relationship.

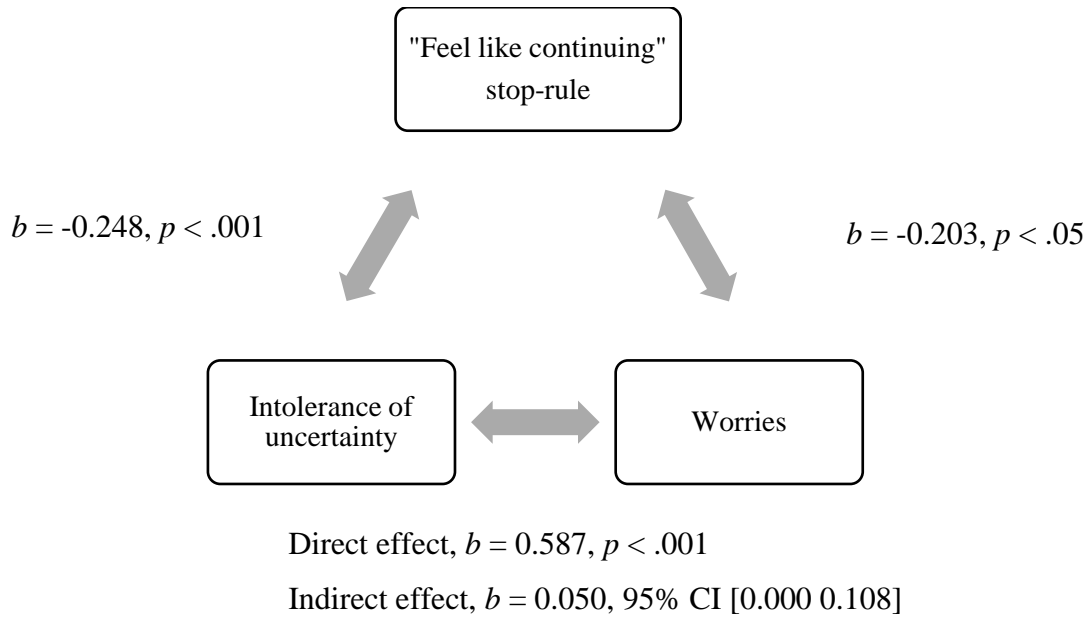


Figure 2. Generic mediation model of intolerance of uncertainty (IUS-12) and worries (PSWQ) through "Feel like continuing" stop-rule (FL).

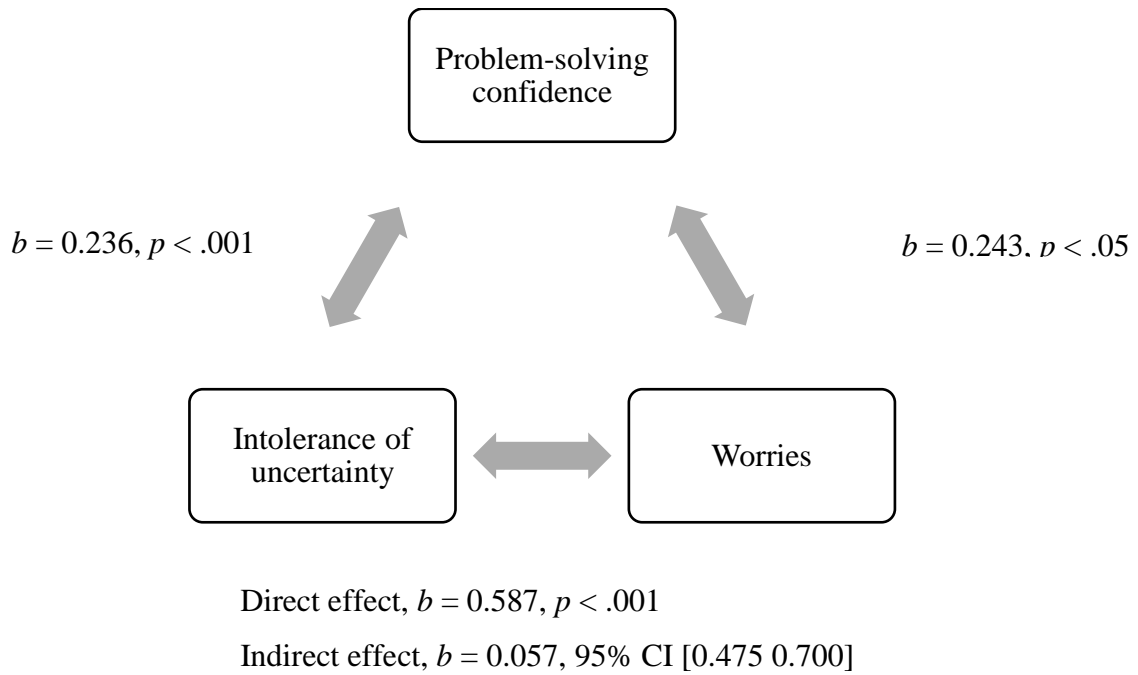


Figure 3. Generic mediation model of intolerance of uncertainty (IUS-12) and worries (PSWQ) through problem-solving confidence (PSC).

Discussion

The purpose of this study was to examine the relationship between the MAI hypothesis and problem-solving confidence specifically and their connection to worries. Based on the results of the study all proposed hypotheses were confirmed. Significant correlational relationships were found between worry (PSWQ and GAD-7), worry behaviour (WBI), intolerance of uncertainty (IUS-12), dysfunctional attitudes (DAS-17), depressive symptoms (PHQ-9), problem-solving confidence (PSC) and both the “As much as can” (AMA) and “Feel like continuing” (FL) stop-rules. The “high worry” group had significantly higher scores on measures of problem-solving confidence, worry behaviour, the “As much as can” stop-rule and intolerance of uncertainty. The “As much as can” stop-rule (AMA) increased the explained variance in a hierarchical linear regression model of worry beyond what worry (GAD-7), depressive symptoms (PHQ-9), dysfunctional attitudes (DAS-17) and intolerance of uncertainty (IUS-12) explained. The “As much as can” stop-rule predicting worry is consistent with Davey (1994). Davey (1994) also found low problem-solving confidence to predict worry but in our study it was not significant. Both stop-rules and low problem-solving confidence were found to mediate the relationship between intolerance of uncertainty (IUS-12) and worry (PSWQ).

This study has certain limitations. First, the sample was homogenous, exclusively university students, with a small age range and predominantly female. Second, due to the Coronavirus, the data collection was conducted both in-person on paper and via online survey software. The online data was gathered during the Coronavirus lockdown since data collection could not be completed in-person. There was a significant difference between the two methods for depressive symptoms (PHQ-9). However, there is no definitive way to determine whether the difference between the data collected using the two different methods was caused by the lockdown or not. Thirdly, the high worry group was much smaller compared to the low worry group. Comparison

between the groups must therefore be taken with reservations. Lastly, the data are correlational in nature and any inference of causation is therefore not possible.

Despite this, the study has significant strengths. Data was collected during multiple time points during the semester to minimize bias in the data. Specifically, to minimize skew towards higher scores which would be caused by periods of high anxiety during the semester (e.g. exam periods). Notably, problem-solving confidence and stop-rules were compared to other known measures of GAD. This was done to explore how problem-solving confidence and stop-rules would connect with worry, intolerance of uncertainty and dysfunctional attitudes. To our knowledge, prior to this study, intolerance of uncertainty had not been connected to problem-solving confidence and stop-rules, in the literature. The relationship between intolerance of uncertainty and worry is mediated by low problem-solving confidence and stop-rules as is evident by the results of this study. The “Feel like continuing” stop-rule had a negative relationship with intolerance of uncertainty and worry in the mediation analysis. This is consistent with other results in the study. The mediation analysis for “Feel like continuing” was borderline significant. This could suggest that the “Feel like continuing” stop-rule could be non-significant with more participants and thus might not mediate the relationship.

Future research and conclusion

The “As much as can” and “Feel like continuing” stop-rules and lack of problem-solving confidence seem to influence the relationship between intolerance of uncertainty and worries. Future research need to explore how the relationship functions, particularly in relation to safety-seeking behaviour. Furthermore, since the data in this study is correlational the next step would be to examine this relationship in an experimental setting.

The “Feel like continuing” stop-rule had a significant negative correlational relationship with the other questionnaires while the other measures had a positive relationship. This suggests that a

higher score on the “Feel like continuing” sub-scale is linked to lower worry scores. The “Feel like continuing” stop rule thus appears to be more associated with a positive way to manage worries. Furthermore, it might be interesting to explore how the relationship of the “As much as can” and “Feel like continuing” stop-rules, respectively, relates to known anxiety related behaviour such as reassurance seeking, avoidance and escape.

The intercorrelation between worry behaviour (WBI) and the other measures used in the study is noteworthy. There was a high correlation between worry behaviour (WBI), intolerance of uncertainty, the “As much as can” stop-rule and dysfunctional attitudes. Worry behaviour and the “As much as can” stop-rule questionnaires both contain items related to planning out every possible outcome, not stopping the cognitive process of worrying until they were satisfied with their “solution” and more. At this point, however, there seems to be a relationship in place but it is only possible to speculate to its nature. Future research needs to be aimed at exploring if worry behaviour and stop-rules, “As much as can” in particular, are indeed two different constructs.

The data used in this study is gathered exclusively from university students. The study needs to be replicated in a clinical sample. A clinical sample might have higher anxiety levels or the relationship between worry, intolerance of uncertainty, stop-rules and problem-solving confidence might differ from a non-clinical sample. The MAI hypothesis (e.g. stop-rules) has been used as foundation for treatment to reduce worry with relative success in a non-clinical population (Dash et al., 2015). A comparison of problem-solving, between a clinical and a control sample might shed light on the function of the relationship between worries, stop-rules and problem-solving confidence.

The cognitive theory of anxiety disorders is prompted by the perception of physical or cognitive threat. That anxious evaluation can derive from dysfunctional attitudes. The MAI

hypothesis assumes that individuals use their mood to help with decision making. Thus, hypothetically, if an individual has negative anxious thoughts and dysfunctional attitudes they are more likely to be in a negative mood. Negative mood has been shown to guide individuals to make decisions with the help of stop-rules (Startup & Davey, 2001). Stop-rules, therefore, seemingly have a bigger influence on worries and anxiety than previously thought. Furthermore, worries and intolerance of uncertainty appear to be mediated by stop-rules and problem-solving confidence. The question can be raised if intolerance of uncertainty is in fact a representation of the negative appraisal individuals have of their ability to handle their problems in daily life.

Worrying is a big part our lives and always will be. Understanding how worrying works is the key to be able to further understand GAD as a disorder and consequently how to enhance treatment success.

References

- American Psychiatric Association (Ed.). (2013). *Diagnostic and statistical manual of mental disorders: DSM-5* (5th ed). Washington, DC.
- Ásta Sigurðardóttir. (2019). *Psychometric properties of the Worry Behaviors Inventory in a clinical- and non-clinical sample* (Unpublished master's thesis). Reykjavík University, Reykjavík.
- Beck, A. T., Emery, G., & Greenberg, R. (1985). *Anxiety disorders and phobias: A cognitive perspective*. New York: Basic Books.
- Behar, E., Alcaine, O., Zuellig, A. R., & Borkovec, T. D. (2003). Screening for Generalized Anxiety Disorder using the Penn State Worry Questionnaire: A receiver operating characteristic analysis. *Journal of Behavior Therapy and Experimental Psychiatry*, *34*(1), 25–43. doi:10.1016/S0005-7916(03)00004-1
- Behar, E., DiMarco, I. D., Hekler, E. B., Mohlman, J., & Staples, A. M. (2009). Current theoretical models of Generalized Anxiety Disorder (GAD): Conceptual review and treatment implications. *Journal of Anxiety Disorders*, *23*(8), 1011–1023. doi:10.1016/j.janxdis.2009.07.006
- Borkovec, T. D., Robinson, E., Pruzinsky, T., & DePree, J. A. (1983). Preliminary exploration of worry: Some characteristics and processes. *Behaviour Research and Therapy*, *21*(1), 9–16.
- Buhr, K., & Dugas, M. J. (2009). The role of fear of anxiety and intolerance of uncertainty in worry: An experimental manipulation. *Behaviour Research and Therapy*, *47*(3), 215–223. doi:10.1016/j.brat.2008.12.004

- 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. doi:10.1016/j.janxdis.2006.03.014
- Clark, D. A., & Beck, A. T. (2011). The Cognitive Model of Anxiety. In *Cognitive therapy of anxiety disorders: Science and practice* (pp. 31–57). New York: Guilford Press.
- Dagný Þorgilsdóttir, & Guðrún Ósk Stefánsdóttir. (2017). *Próffræðilegir eiginleikar IUS og IUS-MV í íslenskri þýðingu: Mælitæki sem meta óvissuþol* (Unpublished bachelor's thesis). Reykjavík University, Reykjavík.
- Dash, S. R., Meeten, F., Jones, F., & Davey, G. C. L. (2015). Evaluation of a brief 4-session psychoeducation procedure for high worriers based on the mood-as-input hypothesis. *Journal of Behavior Therapy and Experimental Psychiatry, 46*, 126–132. doi:10.1016/j.jbtep.2014.09.008
- Davey, G. C. L. (1994). Worrying, social problem-solving abilities, and social problem-solving confidence. *Behaviour Research and Therapy, 32*(3), 327–330. doi:10.1016/0005-7967(94)90130-9
- Davey, G. C. L., Jubb, M., & Cameron, C. (1996). Catastrophic worrying as a function of changes in problem-solving confidence. *Cognitive Therapy and Research, 20*(4), 333–344. doi:10.1007/BF02228037
- Davey, G. C. L., Startup, H. M., MacDonald, C. B., Jenkins, D., & Patterson, K. (2005). The use of “As Many As Can” versus “Feel like continuing” stop rules during worrying. *Cognitive Therapy and Research, 29*(2), 155–169. doi:10.1007/s10608-005-3162-5
- Davey, G. C. L., Startup, H. M., Zara, A., MacDonald, C. B., & Field, A. P. (2003). The perseveration of checking thoughts and mood-as-input hypothesis. *Journal of Behavior*

- Therapy and Experimental Psychiatry*, 34(2), 141–160. doi:10.1016/S0005-7916(03)00035-1
- de Graaf, L. E., Roelofs, J., & Huibers, M. J. H. (2009). Measuring Dysfunctional Attitudes in the General Population: The Dysfunctional Attitude Scale (form A) Revised. *Cognitive Therapy and Research*, 33(4), 345–355. doi:10.1007/s10608-009-9229-y
- Dugas, M. J., Letarte, H., Rhéaume, J., Freeston, M. H., & Ladouceur, R. (1995). Worry and problem solving: Evidence of a specific relationship. *Cognitive Therapy and Research*, 19(1), 109–120. doi:10.1007/BF02229679
- Field, A. (2017). Moderation, mediation and multicategory predictors. In *Discovering statistics using IBM SPSS statistics* (5th edition, pp. 940–941). Thousand Oaks: SAGE Publications.
- Hanrahan, F., Field, A. P., Jones, F. W., & Davey, G. C. L. (2013). A meta-analysis of cognitive therapy for worry in Generalized Anxiety Disorder. *Clinical Psychology Review*, 33(1), 120–132. doi:10.1016/j.cpr.2012.10.008
- Heppner, P. P., & Petersen, C. H. (1982). The development and implications of a personal problem-solving inventory. *Journal of Counseling Psychology*, 29(1), 66–75. doi:10.1037/0022-0167.29.1.66
- Heppner, P. P., Witty, T. E., & Dixon, W. A. (2004). Problem-solving appraisal and human adjustment: A review of 20 years of research using the Problem Solving Inventory. *The Counseling Psychologist*, 32(3), 344–428. doi:10.1177/0011000003262793
- Hirsch, C. R., & Mathews, A. (2012). A cognitive model of pathological worry. *Behaviour Research and Therapy*, 50(10), 636–646. doi:10.1016/j.brat.2012.06.007

- Hrafnhildur Snæbjörnsdóttir. (2018). *Psychometric properties of the Icelandic versions of Generalized anxiety disorder -7 (GAD-7) and Patient health questionnaire – 9 (PHQ-9): Sample of 18-25 years old students* (Unpublished master's thesis). Reykjavík University, Reykjavík.
- Ingvar Eysteinnsson. (2019). *Estimated prevalence of depression and specific anxiety problems among Icelandic university students* (Unpublished master's thesis). Reykjavík University, Reykjavík.
- Karen Jónsdóttir, & Signý Sigurðardóttir. (2016). *Próffræðilegir eiginleikar íslenskra þýðinga á Sheehan Disability Scale, Quality of Life Scale og The Patient Health Questionnaire* (Unpublished bachelor's thesis). University of Iceland, Reykjavík.
- Kim, H.-Y. (2013). Statistical notes for clinical researchers: Assessing normal distribution (2) using skewness and kurtosis. *Restorative Dentistry & Endodontics*, 38(1), 52–54.
doi:10.5395/rde.2013.38.1.52
- Kroenke, K., Spitzer, R. L., & Williams, J. B. W. (2001). The PHQ-9: Validity of a brief depression severity measure. *Journal of General Internal Medicine*, 16(9), 606–613.
doi:10.1046/j.1525-1497.2001.016009606.x
- Mahoney, A. E. J., Hobbs, M. J., Newby, J. M., Williams, A. D., Sunderland, M., & Andrews, G. (2016). The Worry Behaviors Inventory: Assessing the behavioral avoidance associated with Generalized Anxiety Disorder. *Journal of Affective Disorders*, 203, 256–264.
doi:10.1016/j.jad.2016.06.020
- Martin, L. L., & Davies, B. (1998). Beyond hedonism and associationism: A configural view of the role of affect in evaluation, processing, and self-regulation. *Motivation and Emotion*, 22(1), 33–51. doi:10.1023/A:1023092508471

- Martin, L. L., Ward, D. W., Achee, J. W., & Wyer, R. S. (1993). Mood as input: People have to interpret the motivational implications of their moods. *Journal of Personality and Social Psychology*, *64*(3), 317–326. doi:10.1037/0022-3514.64.3.317
- Meeten, F., & Davey, G. C. L. (2011). Mood-as-input hypothesis and perseverative psychopathologies. *Clinical Psychology Review*, *31*(8), 1259–1275. doi:10.1016/j.cpr.2011.08.002
- Meyer, T. J., Miller, M. L., Metzger, R. L., & Borkovec, T. D. (1990). Development and validation of the Penn State Worry Questionnaire. *Behaviour Research and Therapy*, *28*(6), 487–495. doi:10.1016/0005-7967(90)90135-6
- Robichaud, M., & Dugas, M. J. (2005). Negative problem orientation (Part II): Construct validity and specificity to worry. *Behaviour Research and Therapy*, *43*(3), 403–412. doi:10.1016/j.brat.2004.02.008
- Spitzer, R. L., Kroenke, K., Williams, J. B. W., & Löwe, B. (2006). A brief measure for assessing Generalized Anxiety Disorder: The GAD-7. *Archives of Internal Medicine*, *166*(10), 1092. doi:10.1001/archinte.166.10.1092
- Startup, H. M., & Davey, G. C. L. (2001). Mood as input and catastrophic worrying. *Journal of Abnormal Psychology*, *110*(1), 83–96. doi:10.1037//0021-843X.110.1.83
- Vijay, K. G., Avasthi, A., & Grover, S. (2014). A study of worry and functional somatic symptoms in generalized anxiety disorder. *Asian Journal of Psychiatry*, *11*, 50–52. doi:10.1016/j.ajp.2014.05.011
- Weissman, A. N., & Beck, A. T. (1978). Development and validation of the Dysfunctional Attitude Scale: A preliminary investigation. Paper presented at the meeting of the Association for the Advancement of Behavior Therapy, Chicago.