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Representing Uncertainty: Beliefs and Habits in the International Development Evaluation Context

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Representing Uncertainty: Beliefs and Habits in the International Development Evaluation Context

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ABSTRACT

Evaluation can be imagined as an uncertainty management strategy and evaluators as a class of professionals whose role is reducing uncertainty for decision-makers. In the development sector, uncertainty about the efficacy of various interventions exists and evaluations are needed to improve organizational resource utilization. Representations of uncertainty impact decision-making. Evaluator beliefs and routines regarding uncertainty representation in evaluation reports contribute to the ability of evaluation to influence decisions about development programs and policies. Uncertainty, as a social construct, can only be understood in reference to a context. This study aimed to explore uncertainty representing beliefs and habits within the evaluation context. Social Representations Theory is used to situate evaluators within an evaluation context and explain the process by which individual beliefs and habits for representing uncertainty form.

Data were collected from 196 evaluators working in the international development context via an online survey. Results indicate that evaluators are generally uncertainty-oriented people who believe uncertainty should be represented in evaluation reports. However, a gap between their beliefs and habits was identified. Latent profile analysis suggests the existence of two groups of evaluators. The majority of evaluators fall within a "Conventional Uncertainty Representing Evaluators" group, with a small minority of "Heterodox Uncertainty Representing Evaluators" exhibiting above average beliefs and habits. Evaluator Uncertainty Representing group membership is significantly predicted by organizational uncertainty management styles after controlling for evaluator experience and education. Organizational uncertainty management styles are also significantly associated with the beliefs-habits gap.

Answers to the research questions in this study provide initial support for an evaluation context model in which evaluator habits and beliefs about uncertainty in the evaluation context are not only being shaped by the

organizational context, but also shaping the organizational context. I argue that these findings suggest social representations about uncertainty that exist within particular organizational contexts explain the existence of a conventional majority and a heterodox minority of evaluator beliefs and habits and that evaluators working within these contexts reinforce such beliefs and habits among new colleagues.

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CHAPTER ONE

INTRODUCTION

"True genius resides in the capacity for evaluation of uncertain, hazardous, and conflicting information" – Winston Churchill

Statement of the Problem

Uncertainty about the efficacy of international development interventions and the need for information about how to improve organizational resource utilization motivates evaluation (Pritchett, 2002). In 2011, the United States Agency for International Development (USAID) adopted an ambitious policy to become "the world leader in monitoring and evaluation" and use this evidence for planning foreign aid budgets to address development needs (USAID, 2016). Since the release of USAID's evaluation policy, the number of evaluations commissioned has increased to an average of about 200 per year, totaling more than 1,100 evaluations as of 2016 (USAID, 2016). With such expansive growth in evaluation systems, modern society is one in which evaluation has become a routine aspect of organizational life (Dahler-Larsen, 2012). To describe this expansion and institutionalization of evaluation systems their associated logics, Dahler-Larsen (2012) coined the term 'evaluation machine'. Inquiry into the contextual factors shaping these 'evaluation machines' is important to understand decision-making about programs and policies that intervene in other critical anthropogenic processes such as food systems, healthcare, and poverty.

Evaluation has been described as judgment against criteria standards for the purpose of (1) informing decisions, (2) establishing or altering attitudes, (3) substantiating previous decisions or actions, or (4) building an individual's or an organization's evaluation capacity (Alkin & King, 2017; Barbier, 2012). It is an emergent process embedded within and influenced by context. Factors such as historical sensitivities, political values, institutional norms, and cultural belief

systems influence the questions asked, methods used, and judgments made during an evaluation, which in turn impact evaluation findings (Dahler-Larsen & Schwandt, 2012; Fitzpatrick, 2012).

Recent thinking also highlights uncertainty within the evaluation context, positioning evaluators as agents of uncertainty management who must sensitize stakeholders to sources of uncertainty in evaluation and facilitate engagement with uncertain findings (Morell, 2010; Patton, 2011). As such, evaluation can be imagined as an uncertainty management strategy and evaluators as a class of professionals whose role is managing uncertainty for decision-makers. So, we might ask, how well does evaluation manage uncertainty about intervention safety and efficacy and how do the beliefs and routines of evaluators contribute to the ability of evaluation to achieve this goal?

Purpose of the Study and Research Questions

The purpose of this study was to explore the beliefs and habits of international development evaluators toward representing uncertainty in evaluation reports. A new uncertainty representing beliefs and habits scale was also evaluated to measure latent group structures. Finally, this study sought to depict a new model for understanding the evaluation context. The research questions that specifically guided this study were:

1. How uncertainty or certainty oriented are evaluators working in the international development context?
2. What are evaluator beliefs and habits about representing uncertainty in evaluation reports?
3. To what degree do evaluators in international development share common beliefs and habits for representing uncertainty?
4. How do perceived organizational uncertainty management orientations influence evaluator beliefs and habits?
5. What formats for representing uncertainty do evaluators use?

Evaluation Context

Evaluators encounter many sources of uncertainty about the information they gather about social programs and policies (Rog, 2012). For instance, an analyst may be unsure about the appropriate applicable social theory (i.e., causal uncertainty), how stakeholders will react findings (i.e., social uncertainty), how to collect data from internally displaced populations (i.e., task uncertainty), or whether social conflict will erupt during the evaluation (i.e., situational uncertainty). While some sources of uncertainty are less contextually embedded, other sources arise directly from unique contextual elements surrounding the evaluation. As a relational concept, uncertainty is co-constructed among actors and can only be understood within context. A growing literature explores context in relation to evaluation processes to guide evaluators toward context-sensitive evaluation practice (Rog, 2012). Despite recognition that 'evaluation context' is an important component of evaluation practice and knowledge, the term suffers from conceptual ambiguity, differing definitions and meanings, and lacks integration into evaluation theory (Fitzpatrick, 2012; Greene, 2005). The next sections review current models of the evaluation context in order to locate the uncertainty representing beliefs and habits of evaluators within a contextual framework.

Models of Evaluation Context

Depicting a model of the evaluation context is foundational to understanding evaluator beliefs and habits for representing uncertainty. Three primary models have emerged from initial attempts to describe components of the evaluation context. First, Greene (2005) defined context broadly as "the setting within which the evaluand (the program, policy, or product being evaluated) and thus the evaluation are situated" (p. 83). She outlined five elements to context relevant to evaluation: demographic characteristics of the setting and the people who inhabit it, material and economic resources available

in the setting, institutional and organizational climate, the typical means of interaction and norms that guide relationships in the setting, and political dynamics of the setting, including contested issues and interests. Building on Greene's definition of context, Rog (2012) proposed a model in which physical, organizational, social, cultural, tradition, political, and historical aspects are woven into five contextual layers. These contextual layers include the context of the problem or phenomenon being addressed; the context of the intervention being examined; the broader environment or setting in which the intervention is being studied; the parameters of the evaluation itself (i.e., evaluation context); and the broader decision-making context (Rog, 2012). From this perspective, the evaluation context is one of five commensurate and overlapping layers narrowly defined as the budget, time, and the data available for the evaluation.

A second picture of context in the evaluation literature, developed by Alkin (2012), describes an overarching 'evaluation context' defined as "the characteristics of the evaluation situation and its participants and surroundings" (p. 291). Nested within the evaluation context, he describes four components: program, organization, social, and political contexts. This view also distinguishes between an evaluation context and the evaluator context, where the evaluator context recognizes that evaluators have views about how an evaluation should be conducted that must be accounted for throughout the evaluation. This model is distinct from that offered by Greene and Rog in that the evaluation context is a higher order 'layer' instead of one of five interacting components. Moreover, neither Greene or Rog treat the evaluator context as a distinct analytical layer implying that evaluator background, beliefs, and routines exist outside of 'context'.

Similar to Alkin, Vo's (2012) third model of contexts also treats evaluation context as a higher-order construct defined as "the conditions under which an evaluation takes place, and can include the sources of influence that determine the ways in which an evaluation is conducted" (p. 45). From a descriptive analysis, Vo (2012) identified stakeholder, program, organization,

historical/political, and evaluator contexts as five nested components within the evaluation context. First, stakeholder context is defined as the circumstances under which individuals who operate within or are affected by the program are included in the evaluation and the information needs, values, and expertise they bring to the process. Second, program context is characterized as the program's size and stage of development, as well as the human and material resources that are required to operate it. The organizational context is the organization within which the program is nested. This third contextual component is viewed as a higher level of aggregation of the program context where organizational values replace program mission. Fourth, the "historical/political" dimension includes both the historical events – including policy initiatives, advances in research, etc. – that generated the program as well as the nature of relationships that shape the program being evaluated. Finally, the evaluator context consists of the skills, knowledge, values, and theoretical orientations of evaluators going about their work (Vo, 2012).

Complex Systems & the Evaluation Context

       Although noting that context is complex, current models fail to illustrate the evaluation context as a complex adaptive system and examine the nature of uncertainty in context. More recent models of evaluation practice have begun to bring attention to uncertainty in evaluation practice. Morell (2011) and Patton (2010) both position evaluation within a complex adaptive systems framework. From a complex systems perspective Morell (2011) highlights that evaluation processes are part of a dynamic system which includes the evaluand, stakeholders, evaluators, and underlying causes and conditions that result in unanticipated and unforeseeable outcomes. In discussing uncertainty as one characteristic of complex systems, Patton defines uncertainty as "a situation where it's not at all clear what might happen, let alone how likely the possible outcomes are" and contrasts it with the concept of risk where the range and likelihood of possible outcomes are known.

Thus, it becomes important to see evaluators as embedded in the evaluation context and analyze their dynamic interrelationships within it. For instance, Patton indicates that the typical evaluator response to program uncertainty is to "insist on greater clarity, require more detailed work on the logic model, and demand more specificity about expected outcomes" (p. 133). Instead of attempting to reduce uncertainty, Patton advocates for adaptive, flexible evaluation processes in which evaluators and stakeholders embrace ambiguity and uncertainty in process and findings. Although prescriptive evaluation models are bringing attention to the existence of uncertainty in evaluation practice, more work is needed to understand how evaluators think about and engage with uncertainty and how contexts influence these thoughts and routines. As a component of a complex system, evaluator beliefs and routines form a feedback loop that further influences how other actors think about and engage with uncertainty about development programs. The ways in which commonsense understandings, or social representations, of uncertainty as something 'temporally acceptable' or 'must be resolved immediately', 'a risk' or 'an opportunity', act as a contextual constraint on evaluators as they create and disseminate evaluation knowledge is also an important avenue for future exploration.

Importance of the Study

The evaluation context imposes constraints on evaluators that make evaluation distinct from traditional research (some of which can be categorized as evaluative) in several ways. First, evaluations are more likely to be designed for an intended use by an intended user. Their applicability is often context specific and designed to answer instrumental questions to guide decisions about specific policies or programs. Thus, many evaluation models advocate for including influential stakeholders in selecting questions, drafting data collection instruments, and finalizing reports. Evaluator professional autonomy in these

relationships varies as a function of position (e.g., internal or external to the institution), profit-maximizing behavior of evaluation firms, and deprofessionalization of expert practice (Dahler-Larsen, 2012; Schwandt, 2017). Evaluations are also less likely to undergo independent peer review (meta-evaluation) and be published in publicly accessible formats than conventional research. It is plausible that these contextual factors result in different social representations of uncertainty than those that exist among researchers working in academia and thus warrants focused inquiry.

This study is significant because it attempts to apply research on uncertainty to models of evaluation as a complex adaptive system and draw new insights into theory on evaluation contexts. Using the Social Representations Theory, I first hope to illuminate the dynamic interplay between evaluators and other contextual levels to depict uncertainty within a complex systems framework of evaluation context. Insights from this study expand current conceptual models of evaluation context. Moreover, since previous research has shown that the level of detail and format for representing uncertainty impacts decision-making (Durbach & Stewart, 2011), results will begin to provide important practical implications for context sensitive evaluation approaches and evaluation use. Lastly, this study constructs a new scale for measuring uncertainty representation beliefs and habits that can be used for future research on the topic.

Conceptual Framework

A more detailed description of the theories related to evaluation context, uncertainty, and complex adaptive systems will be discussed in Chapter 2, but the theoretical framework that was used for this study is introduced here, so as to frame the purpose and organization of the study and the research questions. Drawing from Alkin's model of evaluation context and advances in complex systems thinking in evaluation that position uncertainty as an inherent

phenomenon in that context, the conceptual model used for this study (Figure 1) depicts three nested units of analysis: the national context, the organization/institutional context, and the evaluator context. I propose that interaction among these contextual levels generates social representations that influence to what extent and how uncertainty can or should be represented in evaluation.

The macro context consists of the country in which international development programs are implemented and its unique historical, political and socio-cultural influences on evaluation systems. Organizations implement and evaluate programs within this national context and are often constrained local needs and regulations. At the individual level, the evaluator context is nested within the organizational/institutional context, as well as a national context. As a component of a complex system, evaluator beliefs and routines form a feedback loop that further influences how other actors think about and engage with uncertainty about development programs. Evaluators working within the same organizational/institutional context likely have diverse cultural backgrounds, educational training, socioeconomic status, and uncertainty orientation. They produce evaluation communications (e.g., evaluation reports, capacity building, training) individually and in collaboration with other evaluators through which social representations of uncertainty form.

To understand evaluator beliefs and habits about representing uncertainty as a function of the evaluation context, this study uses insights from Social Representations Theory (SRT) (Moscovici, 2008). A social representations lens helps conceptualize uncertainty in the evaluation context as a symbolic structure of shared meaning and knowledge arising from the dynamic interactions among the evaluator, organizational, and national contexts. Thus, it also addresses the limitation of existing evaluation context models in depicting it as a static system.
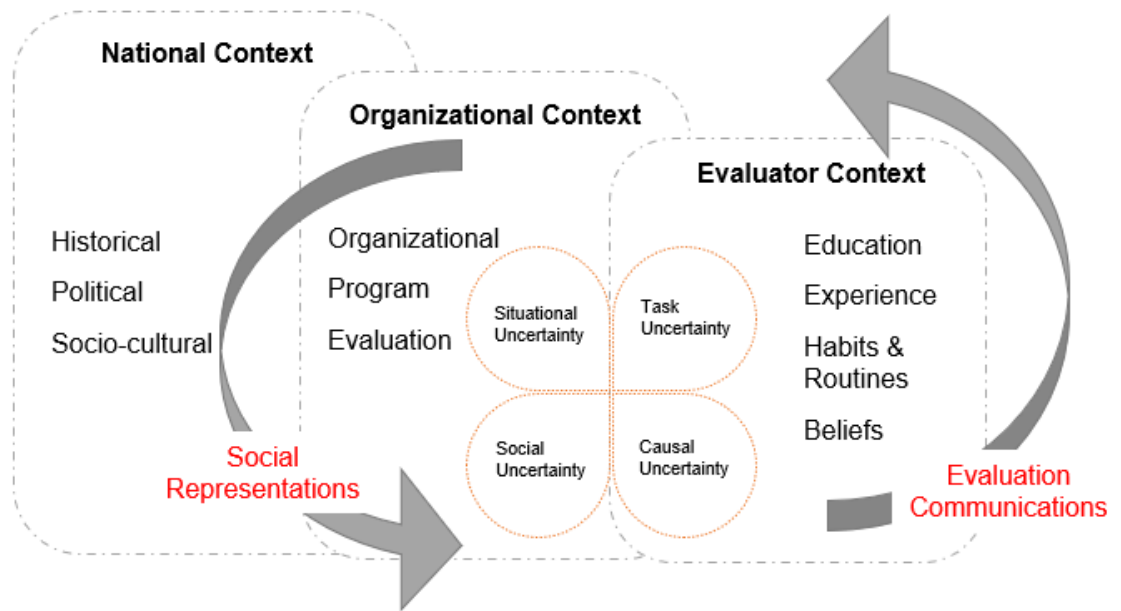
Figure 1: Conceptual Model of Uncertainty in the Evaluation Context

In addition, SRT suggests that organizational motivations to avoid or embrace uncertainty are implicitly or explicitly communicated, in part, via these social representations and shape the beliefs and habits of evaluators working within them. It follows that the shared meaning about uncertainty constrains evaluator thoughts and actions about appropriate ways to represent evidential uncertainty in evaluation reports. Although acting within structural constraints, SRT also orients our attention to the role of evaluator beliefs, tolerance for uncertainty, and evaluation reporting routines in either resisting or reproducing existing social representations of uncertainty.

The following hypotheses, extending from the aforementioned research questions, will be tested this study:

Hypothesis 1: Evaluators working in the international development context are generally uncertainty oriented.

Hypothesis 2: Evaluators in international development share common beliefs and habits for representing uncertainty, forming a single homogenous group.

Hypothesis 3: Evaluator characteristics (education, experience, uncertainty orientation) positively influence on uncertainty representing beliefs and habits.

Hypothesis 4: Perceptual and expressed organizational uncertainty management orientations positively influence evaluator uncertainty representing beliefs and habits, while outcome uncertainty management negatively influences these beliefs and habits.

Organization of the Study

This quantitative study is developed using a five-chapter structure. Chapter 1 introduces the concept of uncertainty in the evaluation context and

sets forth the importance and need for the study. Chapter 2 provides a comprehensive review of the existing literature related to uncertainty orientation, and critiques treatment of uncertainty in the evaluation literature. Specifically, Chapter 2 reviews of the literature on dimensions of ignorance and social representations as a framework for investigating uncertainty in the evaluation context. Chapter 3 will specifically address the research methodology to be used in this study. Chapter 4 will highlight the findings of the study. Finally, Chapter 5 will discuss the application of these findings for practitioners and provide suggestions for future research.

CHAPTER TWO
LITERATURE REVIEW

"I can live with doubt and uncertainty. I think it's much more interesting to live not knowing than to have answers which might be wrong" – Richard Feynman

Evaluators are often tasked with providing evidence to judge the merit, worth and significance of a development program or policy interventions. Yet, credible judgments are dependent upon the quality and nature of evidence collected. Claims for international development intervention effectiveness, relevance, or sustainability are based upon different types of evidence that may be inconsistent and create uncertainty about the extent to which goals have been achieved. If how we see something determines what we do with it, how do evaluators in the international development context view this uncertainty and how do they believe it should be represented? Is representing uncertainty about international development interventions considered important? To explore these questions, the following chapter reviews literature on dimensions of uncertainty, uncertainty management, and blissful uncertainty. It then reviews ways in which scientific uncertainty can be quantitatively and qualitatively represented. Next, the chapter explores Social Representations Theory and its value for understanding how evaluators understand, and ultimately represent, scientific uncertainty about development interventions in the evaluation context. Finally, this chapter provides a brief overview of the development of thought related to uncertainty in the evaluation literature, which raises questions that challenge existing notions of evaluation context and demand further study.

Uncertainty

Uncertainty, defined as "a cognitive state that arises when details of any situation are ambiguous, complex, unpredictable, or probabilistic; when

information is unavailable or inconsistent; and when people feel insecure in their own state of knowledge or the state of knowledge in general" takes on many forms (Vishwanath, 2003, p. 580). One common way of classifying uncertainty is along an 'objective' or 'subjective' axis (Smithson, 1989). Objective uncertainty, often referred to as aleatory uncertainty, corresponds to the variability inherent to a stochastic system (Campos et al., 2007). This type of uncertainty is irreducible since more information cannot diminish such variability. Alternatively, subjective uncertainty comes from scientific ignorance and may arise from measurement limitations, insufficient data, or lack of knowledge about how to interpret data (Colyvan, 2008; Ülkümen et al., 2016). Subjective uncertainty is thus, in theory, reducible by gathering more data or generating more precise measurement instruments.

Uncertainty can be experienced by individuals or by groups (i.e., collective uncertainty). For example, evaluation teams may experience collective uncertainty when they take on a new project, hire a new team member, or change leadership. Likewise, organizations may experience collective uncertainty when development policies change, funding structures shift the evaluation market, or new partnerships are established. Such collective uncertainties cannot be managed or controlled by a single actor (Beckman et al., 2004). Collective uncertainties about the efficacy of various development interventions motivates, in part, advocacy for rigorous program and policy evaluation (Pritchett, 2002). Thus, uncertainty is relational (Brugnach et al., 2008). For instance, ways in which people manage uncertainty generates social capital and cohesion (e.g., strong group identification, commitment formation, privacy agreements). Moreover, participatory evaluation or development models may generate types of uncertainties that cannot be quantified. A relational view of collective uncertainties in the international development context invites evaluators and other actors to leverage uncertainty to ask interesting and thoughtful questions about the unknown.

Dimensions of Uncertainty

People think and act as if there are different types of uncertainty and preferences for certain types of uncertainties over others (Smithson, 1989; Smithson, 2012). Positioning uncertainty (and uncertainty avoidance) within a broader framework of ignorance, Smithson (1989) includes probability, ambiguity, and vagueness as distinct dimensions of uncertainty. Each of these dimensions necessitates different modes of representation. For instance, probability theory is a mathematical framework for representing variability, sometimes referred to as objective or aleatory uncertainty, arising from stochastic or random processes (Colyvan, 2008; Ülkümen et al., 2016). Probability theory generates quantifiable expectations that can be more or less certain given a finite set of outcomes (Zinn, 2008). In contrast, ambiguity and vagueness are often treated as non-probabilistic forms of uncertainty and are not quantifiable (Smithson, 1989).

Applied to decision-making, ambiguity has also been used in referring to the capacity to entertain more than one interpretation of a problem (Cairney, 2020). In participatory evaluation or development models, people may have different interpretations of how to define a problem and the questions to be asked. Accordingly, a situation can be uncertain but not ambiguous if decision-makers choose to focus on only one interpretation of a problem at the expense of others (Cairney, 2020). Finally, vagueness, by contrast, refers to a source of uncertainty that originates from vagueness in language that leads to borderline cases that obfuscate estimation of certain categories (Colyvan, 2008). For instance, if evaluators are assessing needs of 'vulnerable people' in Myanmar, inclusion criteria must be set based on some arbitrary threshold for what constitutes 'vulnerable'. Borderline cases both above and below this arbitrary threshold present opportunity for uncertainty to arise. People relate to these types of uncertainty and attempt to manage them using a myriad of strategies.

Uncertainty Orientation & Management

This section reviews these concepts and how individuals and organizations relate to and manage uncertainty. Individuals can be located along a continuum from certainty-oriented (i.e., reduce uncertainty and prefer to maintain clarity) to uncertainty-oriented (i.e., find uncertainty desirable). Importantly, neither uncertainty-oriented nor certainty-oriented people are assumed to avoid uncertainty, but rather they seek to either maintain certainty or engage with it through management strategies (Shuper et al., 2004). Uncertainty oriented people are described as "need to know, scientific, or investigative types" (Hogg, 2000). According to uncertainty orientation research, individuals' develop cognitive schemas based on their orientation which interact with situational cues that motivate them to either engage or disengage with uncertainty (Shuper et al., 2004; Sorrentino & Short, 1986)*.* Uncertainty orientation has been linked to distinct information processing styles and increased likelihood of adopting new evidence-based practices (Rosen et al., 2014; Sorrentino & Short, 1986). Uncertainty management has been used to describe these behavioral tendencies to reduce, avoid or embrace uncertainty among individuals or organizations (Clampitt & Williams, 2007). Clampitt and Williams (2007) show interactions between perceived organizational certainty or uncertainty orientation and individuals create distinct organizational contexts.

Acting within contextual norms, people manage uncertainty through information seeking (Kramer, 1999), stronger group identification or commitment formation (Baker & Carson, 2011; Hogg, 2000; Yamagishi et al., 1998), rituals (Boyer & Liénard, 2006; Merkin, 2006), probabilistic quantification (Gigerenzer, 1989; Smithson, 1989), abstract construal (Namkoong & Henderson, 2016), and adaptation (Baker & Carson, 2011). In addition to the uncertainty management strategies previously listed, Clampitt and Williams (2007) propose that employees use process uncertainty (i.e., comfort in making a decision on intuition or a hunch), outcome uncertainty (i.e., need to have detailed plans or know the specific outcome of a task or project), and perceptual uncertainty (i.e., willingness

to actively look at different perspectives, new ideas, or signs that the situation is changing) to manage uncertainty in their work roles. At the organizational level, expressed uncertainty (i.e., degree to which the organization encouraged employees to express doubts or misgivings), outcome uncertainty (i.e., degree to which the organization needed detailed plans or a specific outcome before starting a project), and perceptual uncertainty (i.e., degree to which the organization was willing to actively look for new ideas to address problems or signs that the situation was changing) emerged as uncertainty management orientations.

Blissful Uncertainty

In a society characterized by easily accessible information, the problem of information overload requires management. Intentionally forgetting select information or constructing vast amounts of it as irrelevant helps individuals and organizations to cope with uncertainty arising from too much information in complex and changing environments (Beierle & Timm, 2019). Here, it is helpful to draw upon Smithson's concept of irrelevance, or active acts of ignoring information, and Rayner's (2012) comparable concept of blissful uncertainty where known information is ignored or considered taboo. Thus, uncertainty is avoided, or certainty maintained, through an active process of constructing some information, particularly that which can undermine critical organizational goals or arrangements (i.e., uncomfortable knowledge) irrelevant (Rayner, 2012). As organizations cope with uncomfortable knowledge, blissful uncertainty is produced through denial, dismissal, diversion and displacement strategies (Rayner 2012). In the evaluation context, Pritchett (2002) links strategic ignorance (in the form of blissful uncertainty) to organizational capacity to secure political and financial support for development programs and maintenance of organizational legitimacy. Thus, even when information is known, some people view it as irrelevant, unimportant, or even dangerous (Gottschick, 2015).

The uncertainty orientation and uncertainty management frameworks discussed in the previous section suggest the propensity for individuals and organizations to engage in acts of blissful uncertainty, and the social strategies (e.g., denial, dismissal, diversion and displacement) used to achieve it, may vary across cultures. However, in addition to simply ignoring information which may result in uncertainty, groups may distort evidence, thereby intentionally producing uncertainty, to achieve their own ends (Funtowicz & Ravetz, 1990). Distortion arises when a "wrong" idea is substituted, in degree, for the "correct" one (Smithson, 1989). Uncertainty management suggests organizations or individuals will distort information when the probability of a negative outcome is high or a positive outcome is low (Bradac, 2001). Thus, if the probability of positive evaluation outcomes is low, agents representing an organization may seek to distort evidence or the degree of uncertainty around that evidence to represent their program more favorably or less unfavorably. Such distortion influences knowledge about the most appropriate development interventions for a given context, which as Pritchett (2002) points out, may make it easier for advocates to continue securing resources for their preferred intervention.

When motivated to avoid uncertainty, organizations or individuals engage in acts of denial, dismissal, diversion and displacement to deal with 'uncomfortable knowledge' thereby attempting to maintain certainty. However, blissful uncertainty is not always malicious and may be entirely rational is some contexts (Smithson, 1989). Privacy agreements, specialized knowledge distribution, commitment formation, and strong group identification are forms of uncertainty that can generate social capital and cohesion as individuals and organizations cope with the trade-off between information overload and uncertainty. In contrast, when individuals or organizations are motivated to embrace uncertainty, they may engage in information-seeking seeking activities like rigorous evaluation. Individuals working in these environments may resist or reinforce such organizational behaviors depending upon their own uncertainty orientation resulting in status quo, unsettling, stifling, or dynamic climates. People

also prefer certain types of uncertainty (i.e., ambiguity, vagueness, probability) over others and represent them with different linguistic or mathematical symbolic systems.

Representing Uncertainty

Knowledge about development interventions is often constructed through synthesis of multiple sources of information. Combining them to reach credible conclusions has been a persistent challenge in evaluation (see Scriven, 1995), in part, because each source of evidence may contain one or more dimensions of uncertainty. In addition to process, outcome and perceptual uncertainty management strategies discussed earlier, representation through mathematical or linguistic symbols is another way of managing the uncertainty inherent to evaluations of development interventions. For instance, probability theory, possibility theory and evidence theory have been developed to quantitatively represent uncertainty from various sources or combinations thereof. The ways in which uncertainty is represented impacts decision-making (Durbach & Stewart, 2011). Experimental evidence suggests using formats such as probability distributions can overload decision-makers, leading to relatively poor choices (Durbach & Stewart, 2011). In contrast, decision-makers make better decisions when presented with uncertainty in the form of three-point (min-median-max) approximations, quantiles, and scenarios (Durbach & Stewart, 2011).

The problem of quantifying some forms of uncertainty leads some scholars to argue in favor of qualitative approaches, such as dialectical argumentation or scenarios, to representing uncertainty about scientific evidence (Durbach & Stewart, 2011; McBurney & Parsons, 2001). In addition, aleatory uncertainty can also be distinguished linguistically using likelihood statements (e.g., "I believe it is fairly likely," "I'd say there is a 90% chance," "I think there is a high probability") (Ülkümen, Fox, & Malle, 2016). Ülkümen et al. (2016) demonstrated that when speakers use likelihood statements, listeners tend to infer a greater sense of external control over a phenomenon. Perceived

(subjective) uncertainty is also reflected in use of confidence statements such as "I am fairly confident," "I am 90% sure," "I am reasonably certain" resulting in receivers use of singular reasoning, feelings of knowing, perceived internal control (Ülkümen et al., 2016). Given the range of approaches to representing uncertainty and its impact on decision-making, little is known about the formats evaluators use to represent uncertainty or their beliefs about doing so.

Social Representations of Uncertainty

Ignorance, and thus uncertainty, is not an object state externally imposed on humankind but rather is a socially constructed object emerging from human interaction in context (Bradac, 2001; Smithson, 1993). Evaluators are key agents in the social construction of ignorance within the international development context. The discussion above suggests that the interaction of certainty or uncertainty orientation among individuals and organizations generates distinct environments at work (Clampitt & Williams, 2007). If follows that these distinct work environments impose social representations of uncertainty that influence employee beliefs and habits. Understanding how evaluators represent uncertainty requires not only understanding their individual beliefs and habits, but simultaneously positioning them within the beliefs and habits circulating within their organizational context. The following section reviews the Social Representations Theory (SRT) and its value for understanding how evaluators come to understand, and ultimately represent, uncertainty about development programs in the evaluation context.

Social representations (SR) are symbolic systems of ideas, opinions, attitudes, knowledge, beliefs shared by a group about a social object for the purpose of communicating and behaving (Moscovici, 2008). They are the manifestation of joint actions and negotiations over time between members of a social group interacting in a certain context (Raudsepp, 2005). In this way, social representations of an object become collective systems of meaning that regulate the range possible thoughts and actions among group members (Marková,

2012). Markova (2008) points out that different groups and different social contexts not only affect what people represent but also generate different styles of thinking and communicating. Different kinds of knowledge about uncertainty, such as formal probability theory or ideas from religious worldviews, can live side-by-side within individual evaluators despite appearing contradictory, giving the representations formed among evaluators distinct characteristics reflective of socio-cultural contexts (Howarth & Voelklein, 2005).

Social Representations Theory has been used as an analytical framework for studying how beliefs of scientific experts influences communication about environmental risk. Frewer and colleagues (2003) propose the group communicating scientific knowledge will design the information to align with their beliefs about the abilities, attitudes, and responses of the message recipients. They found that many science experts believed that providing the public with information about risk uncertainty would decrease trust in science and scientific institutions, while inciting panic and confusion regarding risk perceptions. These beliefs lead them to sanitize communications of references to uncertainty (Frewer et al., 2003). Similar beliefs and routines have also been observed among journalists, namely downplaying caveats, offering little context, emphasizing product over process, or not explaining disagreements (Stocking, 1996).

Using SRT, the work of Frewer and colleagues (2003) helps explain Fiuntowicz and Ravetz's (1990) observation that a common response of among both decisionmakers and the public is to demand at least the appearance of certainty despite scientists' private reservations of this practice. By not representing uncertainty in scientific communications, scientists and journalists reinforce differing social representations about an issue, or "social polarization" between groups (e.g., experts versus public) (Frewer et al., 2003). Building upon the idea that uncertainty orientation at the cultural, organizational, and individual context form interactions, I propose that these interactions manifest in social representations of uncertainty among evaluator groups that influence how uncertainty about development interventions is represented. As forms of

communication, key evaluation texts provide can provide insights into how uncertainty is socially represented in the field and how evaluators are taught to represent it in their work.

Historical Development of Uncertainty in Evaluation Literature

Evaluation machines, as Dahler-Larsen (2012) characterizes institutionalized evaluation systems, have the potential to catalyze social change in unintended and unforeseen ways. Knowledge constructed via evaluation machines differs from that of conventional research in several ways. First, evaluations are more likely to be designed for an intended use by an intended user. Their applicability is often context specific and designed to answer instrumental questions to guide decisions about specific policies or programs. Second, many evaluation models advocate for including influential stakeholders in selecting questions, drafting data collection instruments, and finalizing reports. Third, evaluations are also less likely to undergo independent peer review and published in publicly accessible formats than conventional research. In essence, the context of evaluation substantially differs from that of traditional research. It consists of shared ideas, practices, language, and textual artifacts used to construct knowledge about social programs and policies, which are expected to result in different representations of uncertainty than those produced by groups working in a traditional research context.

As the previous section illustrates, shared beliefs among groups influence the ways in which they communicate scientific evidence. By extension, shared beliefs about representing uncertainty among evaluators are expected to influence reporting habits, thus constructing more certain or uncertain views of development programming. Given that evaluation differs from traditional research in profound ways, it is important to understand the beliefs and habits of evaluators when it comes to representing uncertainty. The following section reviews the historical development of approaches to managing evidential uncertainty in the evaluation context. These key evaluation texts represent the

source of many evaluator beliefs and habits and provide insight into the importance of uncertainty management in the field.

Approaches to Representing Uncertainty

Evaluation models provide practitioners guidance on how they should conduct evaluations. Knowledge and norms presented in these works may be integrated into evaluator beliefs and routines, influencing how they represent uncertainty in their work to stakeholders. Although evaluation texts date back to the 1960's with work by Michael Scriven (1967) and Robert Stake (1967, 1975), this review begins with Guba and Lincoln's (1989) characterization of evaluation as 1. a sociopolitical process; 2. a joint and collaborative construction of reality; and 3. an emergent process with unpredictable outcomes, thereby implying the existence of ontological and epistemic uncertainty in the evaluation context. While they do not engage explicitly with the notion of uncertainty, their Fourth Generation Evaluation perspective advises evaluators to present the multiple constructions of reality formed during the evaluation process alongside one another within the evaluation report to show where disagreement exists among stakeholders. Another interesting response is to advocate that evaluations are "never completed" but merely "paused" until additional information-seeking opportunities arise suggesting that uncertainty about unresolved constructions and their associated claims, concerns, and issues can ultimately be reduced given enough time.

Nearly a decade later, Weiss, in *Evaluation* (1998) explicitly states that the purpose of evaluation is to collect information that reduces uncertainty about causes and consequences of social programs and policies. Moreover, Weiss gives explicit attention to methods evaluators can use to identify unintended or unanticipated outcomes of a program (i.e., unknown unknowns). Similar to Guba and Lincoln, Weiss suggests that when key actors disagree with findings, their written critiques should be integrated into final reports so readers may consider alternative viewpoints. While she advises evaluators to be candid about strengths

and limitations of an evaluation while indicating the degree of confidence that readers should have in its findings, formats for representing this degree of confidence are not discussed. Finally, this text briefly mentions the possibility of conflict in evaluator-stakeholder relationships due to uncertainty stakeholders have about (potentially negative) evaluation findings but does not discuss how evaluators should engage with stakeholder beliefs and habits for managing uncertainty.

In *Evaluation Methodology Basics* (2005)*,* Davidson dedicates an entire chapter to dealing with causal uncertainty. She makes a critical contribution to thinking about uncertainty in the evaluation context by opining that "evaluation findings are *demonstrably true* when a solid mix of evidence supports a conclusion at or above the level of certainty required in the decision-making context" (p. XV). In establishing the level of certainty required, she also argues that evaluation differs from traditional research in the standards of proof required. She goes on to discuss a current norm of using terms such as 'know' and 'certain' in evaluation practice compared to the more cautious linguistic norms in research like "the evidence appears to suggest" or "we found tentative support for". Rather than ignoring the issue of knowledge uncertainty in evaluation, Davison suggests that evaluators discuss with decision-makers the level of certainty they require to match evaluation methods to their desired level of evidential certainty. Thus, truth and certainty are socially constructed and socially represented differently in the evaluation context. Finally, the text also outlines eight methodological strategies for reducing uncertainty about causal relationships between the program and observed outcomes.

The first text to integrate uncertainty as a defining characteristic of the evaluation context is *Evaluation in the Face of Uncertainty: Anticipating Surprise and Responding to the Inevitable* (Morrell, 2010). From a complex systems perspective this text highlights that evaluation processes are part of a dynamic system which includes the evaluand, stakeholders, evaluators, and underlying causes and conditions that result in unanticipated and unforeseeable outcomes.

Morrell sensitizes evaluators to assess both the conditions in which uncertainty is high and the conditions in which such uncertainty creates obstacles for doing good evaluation. In contrast to Guba and Lincoln (1989), he acknowledges limitations to seeking more information as a way to reduce uncertainty about tasks, causes, and outcomes since what information is relevant and how much is enough generally remains unclear and the cost of information-seeking is high.

According to Morrell, because the degree of uncertainty in an evaluation context varies, evaluation designs should differ based on the degree of existing uncertainty about how programs work and what they achieve. He identifies the richness and tightness of linkages among major elements of the program, "size" of the program relative to the boundaries of the system in which it lives, where the program in its life cycle, how stable the environment is expected be between program implementation and the time we expect results, and how robust the innovation is across time and place as possible sources of uncertainty for evaluators to consider. Finally, the text presents a continuous improvement approach to evaluation in which frequent, small-scale studies designed for rapid feedback and midcourse corrections in contexts where one knows in advance that there is uncertainty about what will happen in the program.

A second key text situating evaluation within a complex systems framework is Patton's (2011) *Developmental Evaluation: Applying Complexity Concepts to Enhance Evaluation Use*. This is the first text where uncertainty is indexed and defined. In a section devoted to uncertainty as one characteristic of complex systems, Patton defines uncertainty as "a situation where it's not at all clear what might happen, let alone how likely the possible outcomes are" and contrasts it with the concept of risk where the range and likelihood of possible outcomes are known. In this Developmental Evaluation model, Patton suggests that evaluators first identify and acknowledge sources of uncertainty. These sources of uncertainty may include inadequate knowledge about how to produce desired outcomes, disagreements among key actors about what to do, value conflicts, and turbulence in the larger environment. A matrix is presented to

illustrate broad situational categories characterized by degree of uncertainty and degree of conflict for evaluators to assess the simplicity or complexity of the evaluation context.

Patton advises that evaluators should work with key stakeholders and primary intended users on an ongoing basis to understand the implications of uncertainty. He further describes that the typical evaluator outcome uncertainty management strategies such as "insist on greater clarity, require more detailed work on the logic model, and demand more specificity about expected outcomes" (p. 133). However, Patton critiques these strategies as rigid and not responsive to the needs of decision-makers in complex systems. Instead of attempting to reduce uncertainty, Patton advocates for adaptive, flexible evaluation processes in which evaluators demonstrate a high tolerance for ambiguity and uncertainty. He states that evaluators must nurture tolerance for ambiguity and messiness by intentionally resisting the temptation to address uncertainty by imposing order and control through the evaluation process. Finally, similar to the continuous improvement approach to evaluation discussed in Morrell (2010), evaluations should be designed to provide rapid feedback about unexpected events and their implications.

Critique of Uncertainty in Evaluation Literature

The evaluation texts reviewed here all provide prescriptions for how evaluators should act in the evaluation context to reduce uncertainty. However, this review raises several questions about representing uncertainty in the evaluation context. First, while Guba & Lincoln (1989) suggest the notion of a never-ending evaluation offers evaluators one option for managing epistemic uncertainty, Morrell's work realistically acknowledges more information is costly and does not necessarily reduce uncertainty. Davidson (2005) provides a practical response to the challenge of costly information by advising evaluators to align the amount of information they collect with the 'necessary' level of precision required by the evaluation context (e.g., stakeholder needs). Attaining a balance

between information and precision requires evaluators to help stakeholders "stay comfortable with a certain amount of fuzziness around the edges" in evaluation reports (p. 136). This contrast between the 'never-ending evaluation' versus 'comfort with fuzziness' raises a question as to what evaluators believe about representing uncertainty and how these beliefs influence their reporting habits.

Second, Weiss brings our attention to the fact that stakeholder uncertainty about evaluation findings can lead to conflict with evaluators. To actively prepare decision-makers for inevitable uncertainty of the findings, Morell and Patton both encourage evaluators to engage with them about the nature of uncertainty as a capacity-building step. Guba & Lincoln (1989) also discussed explicitly acknowledging multiple claims to reality in evaluation reports so that decision-makers can engage with different, potentially conflicting, constructions of how a program works. The ability to engage decision-makers with notions of uncertainty, and actually increase their tolerance for it, leads us to question the extent to which evaluators themselves tolerate evidential uncertainty and are motivated to engage with it.

Third, both Morrell and Patton view the evaluation context as a complex system. This thinking suggests the evaluation context is characterized by an interplay between nested levels of evaluator, organization/institution, and nation. Tolerance of uncertainty and strategies for managing it vary across stakeholders and organizations (Clampitt & Williams, 2007; Kramer, 1999; Sorrentino & Short, 1986). Thus, examining the extent to which evaluator uncertainty representing beliefs and habits are nested within context and influenced by organizational level factors is an important next step in understanding the evaluation context as a complex system. Based upon this review of how prominent evaluation texts engage with the concept of uncertainty, I conclude the evaluation field has, so far, inadequately grappled with uncertainty in the evaluation context. This study attempts to answer the questions brought up in the previous section.

Conceptual Framework

Morrell (2010) and Patton (2011) expand our thinking of evaluation context from static to a complex adaptive system with feedback loops. In this way, we can begin to question what feedback loops exist within and between varies layers of the evaluation context as evaluators identify and represent uncertainty. Yet, despite the emergence of complex systems thinking in evaluation, current models of the evaluation context do not represent the evaluation context as a nested, dynamic system. This gap motivates additional thinking to integrate complexity theory, and more specifically uncertainty as a fundamental motivator of human interaction within that system, into theory about evaluation context.

Drawing from Alkin's model of evaluation context and contributions from complex systems thinking to evaluation that position uncertainty as an inherent phenomenon in that context, the theoretical model used for this study (Figure 1) depicts three nested units of analysis: the national context, the organizational/institutional context, and the evaluator context. Based upon uncertainty orientation and management theories, I propose that interaction among these contextual levels generate social representations of uncertainty. The dominant social representations within an evaluation context generates an operating climate that constrains the evaluation methods selected and how to represent uncertainty inherent to evaluation findings. Social representations are therefore depicted in the model as a feedback loop among evaluators, organization, and the nation in which they work. How evaluators communicate about uncertainty in reports and engage with stakeholders about it reinforces or resists current social representations flowing within that context.

The macro context consists of the country in which a development program is implemented and its unique historical, political and socio-cultural influences on evaluation systems. Within the national context, the organizational/institutional context encompasses the factors that influence the operation of evaluation systems and development programs in this network.

Organizational conceptualizations of uncertainty management theory illuminate strategies used by organizations to manage (i.e., embrace or avoid) uncertainty (Bradac, 2001; Clampitt & Williams, 2007). At the individual level, the evaluator context is nested within the organizational context. As a component of a complex system, evaluator beliefs and routines form a feedback loop that further influences how other actors think about and engage with uncertainty about development programs. Evaluators working within an organizational/institutional likely have diverse cultural backgrounds, educational training, socioeconomic status, and uncertainty orientation.

Uncertainty is inherent to the evaluation context. As Smithson and others point out, uncertainty is socially constructed and reconstructed through interactions between culture and individuals, and organizations and individuals, respectively. Thus, to integrate uncertainty across the three levels of the evaluation context, this study uses insights from Social Representations Theory (SRT) (Moscovici, 2008). This lens helps conceptualize uncertainty in the evaluation context as a system of shared meaning and knowledge arising from the dynamic interactions among the evaluator, organizational/institutional, and national contexts. It also helps address a limitation of current evaluation context models as static systems by depicting uncertainty as a feedback loop between evaluators and the rest of the evaluation context. It follows that the shared meaning about uncertainty constrains evaluator beliefs and habits about appropriate ways to represent evidential uncertainty in evaluation reports. Although acting within structural constraints, SRT also orients our attention to the role of evaluator beliefs, uncertainty orientation, and reporting habits in either resisting or reproducing existing social representations of uncertainty.

CHAPTER THREE
MATERIALS AND METHODS

"Doubt is not a pleasant mental state but certainty is a ridiculous one." -- Voltaire

The purpose of this study is to explore how evaluators working in the international development context represent uncertainty and the role uncertainty orientation has on uncertainty representing beliefs and habits. Using a survey methodology, I aim to answer the following questions:

1. How well does the newly developed scale to measure uncertainty representing beliefs and habits perform?
2. How uncertainty or certainty oriented are evaluators working in the international development context?
3. What are evaluator beliefs and habits about representing uncertainty in evaluation reports?
4. To what degree do evaluators in international development share common beliefs and habits for representing uncertainty?
5. How do perceived organizational uncertainty management habits influence evaluator beliefs and habits about representing uncertainty?
6. What formats for representing uncertainty do evaluators use?

The following theoretical propositions, extending from the aforementioned research questions, guide this study:

Hypothesis 1: Evaluators working in the international development context are generally uncertainty oriented.

Hypothesis 2: Evaluators in international development share common beliefs and habits for representing uncertainty, forming a single homogenous group.

Hypothesis 3: Evaluator context (education, experience, uncertainty orientation) positively influences uncertainty representing beliefs and habits.

Hypothesis 4: Perceptual and expressed organizational uncertainty management orientations positively influences evaluator uncertainty representing beliefs and habits, while outcome uncertainty management negatively influences these beliefs and habits.

Study Design

This dissertation used a web-based survey approach to draw conclusions about how uncertainty orientation influences evaluator beliefs and habits for representing uncertainty in evaluation reports. A survey based upon previously validated scales for uncertainty management and uncertainty orientation (Appendix A) was distributed to evaluators who work in international development. Prior to distribution, the survey was pilot tested among a group of evaluators (n = 12) to improve clarity. The survey was distributed in English under the assumption that international development professionals have a proficient command of the language. Quantitative techniques based upon survey data have been used in cross-cultural comparisons of social representations and are appropriate for this study (Doise, W. et al., 1993). An incentive of $1 per valid survey response was provided with the total donated to the American Evaluation Association international conference attendee fund. The University Institutional Review Board (IRB) approved the project prior to data collection.

Sampling

Participants for this study were recruited through professional associations for evaluators (e.g., American Evaluation Association, Austral-Asia Evaluation Association, European Evaluation Association) and social media groups for evaluators using convenience sampling strategy. A second snowball sampling strategy was used to encourage respondents to share the survey with other evaluators within their organization. This study is considered exploratory, and a power analysis was not conducted since no previous effect size estimations are available. Only evaluators selecting 'yes' to the question "Within the past three years, have you conducted Monitoring & Evaluation (M&E) work in the international development sector?" were included in the sample. Respondents who answered 'no' were directed to the end of the survey.

Measures

Uncertainty Orientation
Individual level uncertainty orientation was measured using a 7-item scale (α = .76) developed by Smith and Bristor (1994) to measure general tendencies for uncertainty or certainty.

Personal & Perceived Organizational Uncertainty Management
The personal uncertainty management scale (α = .70) adapted from Clampitt and Williams (2007) was included as a second individual level factor that measures how evaluators generally manage uncertainty at work. At the organizational level, Clampitt and William's (2007) workplace uncertainty scale (α = .73) measured individuals' perceptions of their organization's uncertainty management habits. Wording of several items was revised to improve comprehension for respondents who do not natively speak English. The response anchor was changed from 7-points to 5-points to make it consistent with the rest of the survey and reduce cogntive burden.

Uncertainty Representing Beliefs & Habits

An original uncertainty representation beliefs and habits scale was created for this study based upon Bonnisone's (1987) recommendations for representing uncertainty in scientific research. The first set of questions aimed to measure evaluators beliefs and consists of 11-items measured on a 5-point scale of 'strongly disagree' to 'strongly agree'. The second set of questions aimed to measure evaluator habits on the same questions using a 5-point scale from 'never' to 'every time'.

Demographics

Demographic questions for gender, education level, years of experience, internal or external role, sector of employment, and country that best represents cultural identity were included in the survey.

Analysis

Table 1 outlines the analyses used in this study to answer each of the five research questions. Descriptive statistics (e.g., means and standard deviations) illustrate evaluator beliefs and habits about representing uncertainty, as well as which formats they generally use to represent uncertainty in evaluation reports. A gap score between evaluator beliefs and habits was also calculated. Second, the psychometric properties of each measurement scale were modeled using graded response models. Graded response models are appropriate for ordinal data (Ferrando, 1999). Factor loadings, item fit statistics, person misfit, internal consistency, and overall model fit criteria were evaluated. In attributing items to factors, a factor loading cutoff point of .50 was used (Howard, 2016). Model fit criteria thresholds of .08 for RMSEA, .05 for SRMR, .97 for CFI and TLI were used as benchmarks for judging the appropriateness of the measurement model (Sivo et al., 2006).

Table 1. Research questions and analysis.

Research Question	Analysis
1. How well does the newly developed scale to measure uncertainty representing beliefs and habits perform?	Graded response models Cronbach's alpha
2. How certainty or uncertainty oriented are evaluators working in the international development context?	Descriptive means and standard deviations; Latent class analysis
3. What are evaluator beliefs and habits about representing uncertainty in evaluation reports?	Descriptive means and standard deviations
4. To what degree do evaluators in international development share common beliefs and habits for representing uncertainty?	Latent profile analysis
5. How do perceived organizational uncertainty management habits influence evaluator beliefs and habits about representing uncertainty?	Logistic regression and linear regression
6. What formats for representing uncertainty do evaluators use?	Descriptive means and standard deviations

Weighted averages based upon factor loadings for each factor were calculated from the preliminary measurement models as gauges of the underlying latent traits they represent for use in subsequent models. Correlations among resulting factors were calculated to identify possible redundancy.

Third, a latent profile analysis with maximum likelihood estimation was conducted to model heterogeneity among evaluator beliefs and habits about representing uncertainty. Latent profile analysis is a model-based classification strategy for dealing with unobserved heterogeneity that are partially corrected for measurement error (Geiser et al., 2014). The best-fitting group model was selected based on BIC. Resulting group structure was cross validated using linear regression models on personal uncertainty management strategies. Theoretical assumptions of this study suggest that evaluator beliefs and habits for representing uncertainty should be correlated with their general personal uncertainty management habits, after controlling for gender, education, and experience since representations is considered another way of managing uncertainty according to Smithson (1989).

To explore how perceived organizational uncertainty management habits influence evaluator beliefs and habits about representing uncertainty, a logistic regression model was used. Evaluator group membership was regressed on individual and organizational level covariates, with cluster robust standard errors at the organizational level. Next, linear regression was used to explore the relationship between individual and organizational factors with the beliefs-habits gap score.

CHAPTER FOUR
RESULTS AND DISCUSSION

Preliminary Analyses and Descriptive Data

Table 2 describes the sample (n = 196). On average, respondents have worked as evaluators for 13.8 years. Over half (57%) currently work as external evaluator with the remaining 43% identifying their role as internal evaluators. Thirty-one percent (31.2%) work in the non-profit sector, 28% are independent consultants, 15.2% in the private sector, 11.2% work for multi-lateral organizations (e.g., United Nations, World Bank), and 7.2% work for government institutions. Only 3.2% of respondents work in the academic sector. Overall, 24.2% indicated they have doctoral level education, 66.1% have a master's degree, and 9.7% have a 4-year degree. Women represent 51.6% of the sample. Respondents came from 66 countries (Appendix A) with the United States being the most common country of origin (23.5%). Evaluators from Kenya accounted for 5% of the sample, followed by Nigeria (4%), Canada (4%), Italy (3.6%), and Germany (3%).

Uncertainty Representing Beliefs and Habits

Responses to questions about uncertainty representing beliefs (Table 3) show that evaluators working in the international development context generally agree or strongly agree to each statement. The greatest level of agreement is for use of representations that protect respondent/informant privacy and ethical considerations ($M = 4.31$, $SD = .79$). Assessing the cost(s) and benefits(s) of representing uncertainty in evaluation reports before presenting final reports to stakeholders was rated the lowest with 12.3% of respondents selecting disagree or strongly disagree ($M = 3.63$, $SD = .94$).

Table 2. Sample characteristics.

Variable	Frequency	Percent or Mean (SD)
Years' experience	118	13.75 (10.1)
Role		
Internal	53	43%
External	70	57%
Sector		
Non-profit	39	31.2%
Consulting	35	28%
Private sector	19	15.2%
Multi-lateral	14	11.2%
Government	9	7.2%
Academic	4	3.2%
Other	5	4%
Education		
4-year degree	12	9.7%
Master's degree	82	66.1%
Doctoral degree	30	24.2%
Gender		
Woman	64	51.6%
Man	59	47.6%
Transgender	1	0.8%

Table 3. Uncertainty representing beliefs means and standard deviations.

Belief	Mean	SD
Use uncertainty representations that protect respondent/informant privacy and ethical considerations	4.31	.79
Explicitly quantify the extent of uncertainty (e.g., using confidence intervals or ranges) in the data when using statistical summaries	4.13	.74
Represent uncertainty in evaluation reports in ways that are responsive to stakeholder needs	4.09	.81
Explicitly represent sources of uncertainty in the data	4.03	.84
Distinguish, where possible, uncertainty that is irreducible (e.g., uncertainty that cannot be resolved by collecting more data) from uncertainty that is potentially reducible (e.g., by collecting more data)	4.00	.91
Explicitly represent the arguments for or against competing hypotheses about the true nature of the data, and of the amount of evidence for and against each hypothesis	3.99	.81
Represent conflict and/or inconsistency in the data	3.92	.94
Report the cost(s) and benefit(s) of making decisions when reducible uncertainty exists	3.82	.83
Match the format (e.g., p-values, visualizations, argumentation) for representing uncertainty to the type of uncertainty information presented (e.g., ambiguous information, conflicting evidence, incomplete information)	3.81	.86
Report the cost(s) and benefit(s) of making decisions when irreducible uncertainty exists	3.78	.87
Explicitly represent psychosocial reasons for uncertainty in the data	3.73	.86
Assess the cost(s) and benefits(s) of representing uncertainty in evaluation reports before presenting final reports to stakeholders	3.63	.94

*5-point rating scale strongly disagree to strongly agree

In line with beliefs about representing uncertainty, habit results (Table 4) indicate that evaluators use uncertainty representations that protect respondent/informant privacy and ethical considerations most of the time (M = 3.93, SD = 1.17). Reporting the cost(s) and benefit(s) of making decisions when irreducible uncertainty exists was used least among this sample (M = 2.48, SD = 1.30). Habits most closely match beliefs when it comes to representing conflict and/or inconsistency in the data (gap = .36) and using uncertainty representations that protect respondent/informant privacy and ethical considerations (gap = .38). Habits and beliefs diverge most for reporting the costs and benefits of making decisions when irreducible (gap = 1.30) and reducible uncertainty exists (gap = 1.26).

Uncertainty Disclosing Formats

Twelve formats for representing uncertainty were evaluated (Table 5). Overall, evaluators use these formats half of the time or less in evaluation reports. The most common formats for representing uncertainty among international development evaluators was confidence intervals (M = 3.03, SD = 1.40) and argumentation (M = 3.02, SD = 1.40). Confidence intervals were always used by 18.5% of respondents, while 15% indicated that they never use them. Similarly, 18.5% selected that they always use argumentation when representing uncertainty in evaluation reports, with 19.3% stating they never use this format. Bayes degrees of belief was the least used format (M = 1.76, SD = 1.12). Sixty percent (60%) of respondents never use Bayes degrees of belief to represent uncertainty while 1.7% stated they always use this format.

Measurement Models

Data from the 196 respondents included in the study were analyzed for missing data patterns. Substantial drop-off occurred throughout the survey resulting in 40% missingness for items near the end.

Table 4. Uncertainty representing habits means, standard deviations and habit-belief gap.

Habits	Mean	SD	Gap
Use uncertainty representations that protect respondent/informant privacy and ethical considerations	3.93	1.17	.38
Represent conflict and/or inconsistency in the data	3.56	1.15	.36
Explicitly represent sources of uncertainty in the data	3.43	1.16	.60
Represent uncertainty in evaluation reports in ways that are responsive to stakeholder needs	3.40	1.24	.69
Explicitly quantify the extent of uncertainty (e.g., using confidence intervals or ranges) in the data when using statistical summaries	3.26	1.23	.87
Explicitly represent the arguments for or against competing hypotheses about the true nature of the data, and of the amount of evidence for and against each hypothesis	3.16	1.17	.83
Match the format (e.g., p-values, visualizations, argumentation) for representing uncertainty to the type of uncertainty information presented (e.g., ambiguous information, conflicting evidence, incomplete information)	3.02	1.28	.79
Distinguish, where possible, uncertainty that is irreducible (e.g., uncertainty that cannot be resolved by collecting more data) from uncertainty that is potentially reducible (e.g., by collecting more data)	2.95	1.20	1.05
Explicitly represent psychosocial reasons for uncertainty in the data	2.78	1.19	.95
Assess the cost(s) and benefits(s) of representing uncertainty in evaluation reports before presenting final reports to stakeholders	2.67	1.34	.96
Report the cost(s) and benefit(s) of making decisions when reducible uncertainty exists	2.56	1.29	1.26

Table 4 continued.

Habits	Mean	SD	Gap
Report the cost(s) and benefit(s) of making decisions when irreducible uncertainty exists	2.48	1.35	1.30

*5-point rating scale strongly disagree to strongly agree

Table 5. Uncertainty representing formats means and standard deviations.

Format	Mean	Standard Deviation
Confidence intervals	3.03	1.40
Argumentation (i.e., arguments for and against a proposition are combined to produce an overall summary of a case)	3.02	1.40
Three-point approximations (e.g., minimum, mean/median, maximum)	2.98	1.37
Scenarios (e.g., descriptions of possible ways in which the future might unfold)	2.95	1.29
Standard deviations or standard errors	2.84	1.34
p-values	2.71	1.36
Quantiles (e.g., 5%, 25%, 50%, 75%, and 95% quantiles of the distribution of attribute)	2.71	1.30
Probability distributions (e.g., histograms)	2.54	1.27
Effect sizes	2.40	1.40
Visualizations of uncertainty (e.g., error bars)	2.39	1.33
Expected values (i.e., predicted value of a variable)	2.35	1.25
Bayes degrees of belief	1.76	1.12

*5-point rating scale never to always

For all 196 respondents, 23 respondents were missing more than 50% of items and 42 items were missing more than 30% of responses. Little's MCAR test was significant [$\chi^2(2125) = 2289.54$, $p = .007$] and missingness could not be reliability predicted from other observed variables, suggesting a non-ignorable missing data pattern. However, since GRM since the items should be related to each other since they are all manifestations of some underlying factor, expectation maximization was used to handle missing data or each scale for psychometric assessment after respondents with no data for that particular scale were deleted.

Individual Uncertainty Orientation

The original six items in the Uncertainty Orientation scale were evaluated for how well they reflect the latent construct of uncertainty orientation using a graded response model. The resulting single factor structure was consistent with Smith and Bristor (1994). However, Item UO_3, 'I like to experiment with new ideas, even if they turn out later to be a total waste of time', loaded onto the latent factor at .48 and was omitted. Cronbach's alpha analysis indicated an increase in internal consistency from .87 to .89 by dropping Item UO_1, which loaded onto the factor at .56. The reduced four item measurement model decreased BIC from 2117 to 1214, with adequate overall model fit criteria M2(2) = .80, $p = .67$, RMSEA = 0, SRMR = .09, TLI = 1. 01, and CFI = 1. All four items had factor loadings greater than .70 and discrimination coefficients greater than 1.7, indicating very high discrimination (Baker & Kim, 2017). Person misfit coefficients indicated 3% of response patterns were not consistent with the model. Evidence suggests that the four-item model performs as well as the six-item model, so the more parsimonious model was used in subsequent analysis (Table 6).

Table 6. Individual uncertainty orientation factor loadings.

Item	Factor Loading
UO_2: If I do not understand something, I seek more information about it	.75
UO_4: I like to find out why things happen	.84
UO_5: I like to put myself in situations in which I could learn something new	.89
UO_6: I enjoy thinking about ideas that challenge my views of the world	.84

*5-point rating scale strongly disagree to strongly agree

Personal Uncertainty Management Scale

A multi-dimensional (MIRT) graded response model was used to fit the revised personal uncertainty management scale using the previously researched three-dimensional model. All items in this 9-item model loaded greater than .50 on a factor. Factor 1 (i.e., Outcome Management) consisted of 'I need to know the specific outcome before starting a task' (.76), 'I need a definite sense of direction for a project' (.78), and 'I need a detailed plan when working on a project' (.79). Factor 2 (i.e., Process Management) includes items 'I am comfortable using my intuition to make decisions' (.81) and 'I am comfortable making decisions spontaneously' (.74). Factor 3 (i.e., Perceptual Management) included 'I am always on the lookout for new ideas to address problems' (.87), 'I actively look for signs that the situation is changing' (.68), 'I quickly respond to changing M&E trends' (.51), and 'Even after I make a decision, I will re-evaluate the decision when the situation changes' (.59). The newly added item, 'Even after I make a decision, I will re-evaluate the decision when the situation changes', did not load with the other decision-making (i.e., process) items as hypothesized when adapting the scale. Instead, it loaded with the perceptual items. The three-factor solution mirrored the original structure identified by Clampitt and Williams (2007) and accounted for 54% of the variance in the latent construct.

Most items exhibited high discrimination coefficients. Items 'I quickly respond to changing M&E trends' (1.02) and 'Even after I make a decision, I will re-evaluate the decision when the situation changes' (1.25) had discrimination parameters considered moderate but were retained in the Perceptual Uncertainty factor. The model showed 4% person misfit and all items had RMSEA values of less than .07. Overall model evaluation criteria suggest marginal fit [$M2(27) = 61$, $p < .001$, RMSEA = .08, SRMR = .11, TLI = .87, CFI = .90]. Internal consistency for Factor 1 (i.e., Perceptual Management) was .72 and would not be improved by dropping any items. Factor 2 (i.e., Outcome Management) had an internal consistency coefficient of .79. Finally, the third factor (i.e., Process Management) had an internal consistency coefficient of .72 and could be improved to .88 by

dropping either of the two variables reflecting this dimension. Since dropping a variable would result in a factor consisting of just a single item, no items were dropped (Table 7).

Organizational Uncertainty Management Scale

A 3-factor (MIRT) graded response model was fit to assess adequacy of the adapted workplace uncertainty management scale. Although all items had high to very high discrimination coefficients and loaded greater than .50 on respective factor with 70% of variance explained, evidence suggests this model has poor fit [M2(27) = 131.42, $p < .001$, RMSEA = .15, SRMR = .24, TLI = .85, CFI = .87]. Item fit is generally adequate with only 'My organization encourages employees to discuss their doubts about a project' showing an item RMSEA of .09, although several exhibit a significant chi-square value suggesting lack of fit (Table 8). Person fit analysis classified 4% of respondent response patterns as misfits. Internal consistency coefficients for factor 1 (i.e., Expressed Management) was .82. Factor 2 (i.e., Outcome Management) had internal consistency of .76 and Factor 3 (i.e., Perceptual Management) exhibited internal consistency of .90.

Uncertainty Representing Beliefs & Habits Scale

A single factor confirmatory graded responses model was fit to assess the 12-item Uncertainty Representing Beliefs Scale. Aside from 'There should be a representation of conflict and/or inconsistency in the data' and 'The cost(s) and benefits(s) of representing uncertainty in evaluation reports should be assessed before presenting final reports to stakeholders', all items loaded greater than .60 on the factor. The item 'There should be a representation of conflict and/or inconsistency in the data' loaded at .52 and 'The cost(s) and benefits(s) of representing uncertainty in evaluation reports should be assessed before presenting final reports to stakeholders' loaded at .44. All items had RMSEA less than .08, and person fit analysis indicated 8% misfit with the response pattern.

Table 7. Personal uncertainty management factor loadings and time fit.

Item	Factor 1: Perceptual	Factor 2: Outcome	Factor 3: Process	Item Fit RMSEA
PUM_3: I need to know the specific outcome before starting a task		.76		.02
PUM_4: I need a definite sense of direction for a project		.78		.06*
PUM_7: I need a detailed plan when working on a project		.79		.06
PUM_1: I am comfortable using my intuition to make decisions			.81	.00
PUM_2: I am comfortable making decisions spontaneously			.74	.03
PUM_5: I am always on the lookout for new ideas to address problems	.87			.03
PUM_6: I actively look for signs that the situation is changing	.68			.07**
PUM_8: I quickly respond to changing M&E trends	.51			.02
PUM_9: Even after I make a decision, I will re-evaluate the decision when the situation changes	.59			.02

*5-point rating scale strongly disagree to strongly agree

Table 8. Organizational uncertainty management factor loadings and item fit.

Item	Factor 1: Expressed	Factor 2: Outcome	Factor 3: Perceptual	Item Fit RMSEA
OUM_1: My organization encourages employees to admit that they are unsure about something	.88			.08***
OUM_2: My organization encourages employees to discuss their doubts about a project	.97			.09***
OUM_3: In my organization, being unsure about something is a sign of weakness	.65			.06*
OUM_4: My organization needs to know the specific outcome before starting a project		.87		.03
OUM_5: My organization needs a detailed plan when working on a project		.74		.05*
OUM_6: My organization actively looks for signs that the situation is changing			.79	.06*
OUM_7: My organization quickly responds to changing trends			.84	.06*
OUM_8: My organization is always on the lookout for new ideas to address problems			.84	.03**
OUM_9: Even after my organization makes a decision, it will re-evaluate the decision when the situation changes			.92	.08

*5-point rating scale strongly disagree to strongly agree

Model fit criteria, however, indicate less than adequate fit of the full single-factor beliefs scale [M2(54) = 147.33, $p <$ .001, RMSEA = .11, SRMSR = .10, TLI = .90, CFI = .92]. The Uncertainty Representing Habits Scale was also assessed using a single factor graded response model. Overall model fit for the 12-item Habits scale was also poor [M2(54) = 371.44, $p <$ .001, RMSEA = .21, SRMSR = .12, TLI = .76, CFI = .81]. Three items (e.g., 'Represent conflict and/or inconsistency in the data', 'Use uncertainty representations that protect to respondent/informant privacy and ethical considerations', 'Explicitly quantify the extent of uncertainty in the data when using statistical summaries') loaded lower than .60 on the factor. Item fit RMSEA was below .08 for all items except 'Report the cost(s) and benefit(s) of making decisions when irreducible uncertainty exists' (RMSEA = .08, $p =$ .01) and 'Report the cost(s) and benefit(s) of making decisions when reducible uncertainty exists' (RMSEA = .09, $p =$ .005). Person fit analysis indicated 6% misfit with the response pattern.

Overall, evidence suggested the Uncertainty Representing Beliefs and Habits scales as originally designed did not result in adequate model fit. To improve fit, three uncertainty disclosing items related to economic factors ('Report the cost(s) and benefit(s) of making decisions when irreducible uncertainty exists', 'Report the cost(s) and benefit(s) of making decisions when reducible uncertainty exists', 'Assess the cost(s) and benefits(s) of representing uncertainty in evaluation reports before presenting final reports to stakeholders') were removed from both the beliefs and habits scales. These items were selected for removal due to their conceptual similarity as well as low item fit or factor loadings on either the beliefs or habits scale.

After removing these items from the beliefs scale, overall model fit criteria suggest a more adequate fit [M2(27) = 45.99, $p =$ .01, RMSEA = .07, SRMR = .07, TLI = .96, CFI = .97]. Moreover, the BIC improved substantially from 3503 to 2620 (Δ = -883) while person fit for this model resulted in 6% of respondents not fitting the response pattern (Table 9).

Table 9. Uncertainty beliefs model fit statistics.

Model	BIC	RMSEA	SRMR	TLI	CFI	Person misfit
12-item Beliefs	3503	.11	.10	.90	.92	8%
9-item Beliefs	2620	.07	.07	.96	.97	6%

Factor loadings for the reduced 9-item Beliefs scale were all greater than .60 with 52% of the variance explained (Table 10). Item fit RMSEA values of .08 or lower for all items except 'Represent uncertainty in evaluation reports in ways that are responsive to stakeholder needs.' This item had RMSEA of .09 (p = .02). Internal consistency for the reduced beliefs scale was .88 and could not be improved by dropping any additional items.

The reduced Habits scale also resulted in substantial improvement by dropping items related to economic issues. BIC decreased to 3221 (Δ = -1075) with 5% person misfit (Table 11). Although overall model fit criteria suggest better fit for the reduced Habits scale [M2(27) = 88, $p < .001$, RMSEA = .13, SRMR = .08, TLI = .91, CFI = .93], it remains less than adequate. Factor loadings for the reduced 9-item Habits scale were all greater than .70 with 54% of the variance explained (Table 12). Cronbach's alpha was .90 for the reduced Habits scale. All items displayed adequate RMSEA below .07.

Means, weighted averages, and standard deviations for each scale are presented in Table 13. Individual Uncertainty Orientation had a mean of 4.51 (*SD* = .68) indicating that evaluators in the international development context are generally uncertainty oriented. They also tend to agree that they (*M* = 4.07, *SD* = .52) and their organization (*M* = 3.82, *SD* = .76) use perceptual uncertainty management strategies. Outcome (*M* = 3.58, *SD* = .88) and process (*M* = 3.29, *SD* = .85) uncertainty management strategies are used slightly less among individuals. Similarly, evaluators also perceive their organizations using outcome (M = 3.53, SD = .99) and expressed (*M* = 3.69, *SD* = .95) uncertainty management strategies slightly less than perceptual.

Uncertainty Management Correlations

Correlations between these factors show that they are related, but distinct constructs (Table 14). Evaluators who are more uncertainty oriented have significantly greater use [r_s = .40, $p < .001$] of perceptual uncertainty management strategies.

Table 10. Uncertainty representing beliefs factor loadings and item fit.

Item	Factor Loading	Item Fit RMSEA
URB_1: Represent conflict and/or inconsistency in the data	.63	.05
URB_2: Explicitly represent sources of uncertainty in the data	.79	.00
URB_3: Explicitly represent psychosocial reasons for uncertainty in the data	.87	.05
URB_4: Explicitly represent the arguments for or against competing hypotheses about the true nature of the data, and of the amount of evidence for and against each hypothesis	.77	.05
URB_5: Distinguish, where possible, uncertainty that is irreducible (e.g., uncertainty that cannot be resolved by collecting more data) from uncertainty that is potentially reducible (e.g., by collecting more data)	.60	.00
URB_6: Match the format (e.g., p-values, visualizations, argumentation) for representing uncertainty to the type of uncertainty information presented (e.g., ambiguous information, conflicting evidence, incomplete information)	.67	.00
URB_10: Represent uncertainty in evaluation reports in ways that are responsive to stakeholder needs	.71	.09*
URB_11: Use uncertainty representations that protect to respondent/informant privacy and ethical considerations	.76	.06
URB_12: Explicitly quantify the extent of uncertainty (e.g., using confidence intervals or ranges) in the data when using statistical summaries	.66	.00

Table 11. Uncertainty representing habits model fit criteria.

Model	BIC	RMSEA	SRMSR	TLI	CFI	Person misfit
12-item Habits	4296	.21	.12	.76	.81	6%
9-item Habits	3221	.13	.08	.91	.93	5%

Table 12. Uncertainty representing habits factor loadings and item fit.

Item	Factor Loading	Item Fit RMSEA
URH_1: Represent conflict and/or inconsistency in the data	.70	.00
URH_2: Explicitly represent sources of uncertainty in the data	.78	.03
URH_3: Explicitly represent psychosocial reasons for uncertainty in the data	.74	.05
URH_4: Explicitly represent the arguments for or against competing hypotheses about the true nature of the data, and of the amount of evidence for and against each hypothesis	.85	.00
URH_5: Distinguish, where possible, uncertainty that is irreducible (e.g., uncertainty that cannot be resolved by collecting more data) from uncertainty that is potentially reducible (e.g., by collecting more data)	.72	.07*
URH_6: Match the format (e.g., p-values, visualizations, argumentation) for representing uncertainty to the type of uncertainty information presented (e.g., ambiguous information, conflicting evidence, incomplete information)	.78	.02
URH_10: Represent uncertainty in evaluation reports in ways that are responsive to stakeholder needs	.78	.04
URH_11: Use uncertainty representations that protect to respondent/informant privacy and ethical considerations	.64	.00
URH_12: Explicitly quantify the extent of uncertainty (e.g., using confidence intervals or ranges) in the data when using statistical summaries	.57	.00

Table 13. Uncertainty management means and standard deviations.

Scale	Mean	Weighted Average	Standard Deviation
Individual Uncertainty Orientation	4.51	4.51	.68
Personal Uncertainty Management: Perceptual	4.07	4.12	.52
Personal Uncertainty Management: Outcome	3.58	3.57	.88
Personal Uncertainty Management: Process	3.29	3.31	.85
Organizational Uncertainty Management: Perceptual	3.82	3.82	.76
Organizational Uncertainty Management: Expressed	3.69	3.73	.95
Organizational Uncertainty Management: Outcome	3.53	3.49	.99

Table 14. Uncertainty management correlations.

Variable	IUO	PUM: Percp	PUM: Out	PUM: Pro	OUM: Percp	OUM: Expr
IUO						
PUM: Perceptual	.40**					
PUM: Outcome	-.10	.10				
PUM: Process	-.01	.14	.17*			
OUM: Perceptual	.22**	.43**	.29**	.06		
OUM: Expressed	.24**	.30**	-.03	.06	.50**	
OUM: Outcome	-.07	.24**	.53**	.07	.10	-.16*

They also work for organizations they perceive as using greater perceptual [r_s = .22, p = .004] and expressed uncertainty management strategies [r_s = .24, p = .001]. Working for organizations perceived as using greater perceptual [r = .43, p < .001], expressed [r = .30, p < .001], and outcome [r = .24, p = .003] uncertainty management was associated with greater use of individual perceptual management strategies. Individual use of outcome uncertainty management strategies is also associated with greater perceived organizational use of perceptual [r = .29, p < .001] and outcome [r = .53, p < .001] uncertainty management strategies.

Uncertainty Representing Profiles

Evaluators working in the international development context are hypothesized to share common beliefs and habits, suggesting a single group. A latent profile analysis on evaluator uncertainty disclosing beliefs and habits was used to assess the underlying uncertainty representing profiles in the sample. Three models reflecting a single group, two group, and three group solution were compared. Results from the final model indicate the existence of two uncertainty disclosing profiles among evaluators based upon BIC. Group one accounts for 82% of respondents and consists of individuals who are below average on representing beliefs and management habits (i.e., Conventional Uncertainty Representing Evaluators). Group two consists of the remaining 18% of respondents who are above average in disclosing beliefs and management habits (i.e., Heterodox Uncertainty Representing Evaluators). Table 15 describes the beliefs and habits of each group.

Conventional Uncertainty Representing Evaluators in this sample have an average of 12 years of experience (Table 16). Most have a master's degree (67%) and 21% have a doctorate. A similar percentage of males and females belong to the group. External evaluators make up 52% of the group, with internal evaluators representing the remaining 46%.

Table 15. Uncertainty representing group means and standard errors.

Trait	Conventional Uncertainty Representing Evaluators (CURE)		Heterodox Uncertainty Representing Evaluators (HURE)	
	Mean	SE	Mean	SE
Uncertainty Disclosing Beliefs	3.77	.05	4.42	.11
Uncertainty Disclosing Habits	2.78	.09	4.05	.16

Table 16. Uncertainty representing group demographic characteristics.

Demographics	Conventional Uncertainty Representing Evaluators (CURE)	Heterodox Uncertainty Representing Evaluators (HURE)
	Mean (SD) / %	Mean (SD) / %
Years' Experience	12 (9.72)	20 (10.77)
Education Level		
4-year degree	12%	0%
Master's degree	67%	64%
Doctorate	21%	36%
Male	48%	48%
Female	52%	52%
Role		
Internal Evaluator	46%	32%
External Evaluator	54%	68%
Sector		
Academic	4%	0%
Government	9%	0%
Non-profit	34%	18%
For-profit/private	15%	18%
Ind Consulting	25%	41%
Multilateral	11%	14%
Other	3%	9%

Evaluators working in the non-profit (34%) and independent consulting (25%) sectors account for most of the CURE group. In contrast, Heterodox Uncertainty Representing Evaluators have an average of 20 years of experience. The majority of HUREs also have a master's degree (64%), but more hold a doctoral degree (36%) than the CURE group. Sixty-eight percent (68%) of HUREs work as external evaluators while 32% are internal evaluators. The largest percentage of HUREs work as independent consultants. None of the HUREs in this sample work in the academic or government sectors. Uncertainty management means and standard deviations for each group are presented in Table 17. Conventional Uncertainty Representing Evaluators have a mean general uncertainty orientation of 4.44 (SD = .69), perceptual uncertainty management of 4.03 (SD = .51), outcome uncertainty management of 3.48 (SD = .86), and process uncertainty management of 3.32 (SD = .83). On average, they perceive their organizations expressed uncertainty management as 3.58 (SD = .92), outcome uncertainty management as 3.38 (SD = .96), and perceptual uncertainty management as 3.69 (SD = .72). Similarly, Heterodox Uncertainty Representing Evaluators have mean uncertainty orientation of 4.60 (SD = .64), perceptual uncertainty management of 4.31 (SD = .50), outcome uncertainty management of 3.72 (SD = .89), and process uncertainty management of 3.28 (SD = .87). HUREs perceive their organization as having expressed uncertainty management of 4.01 (SD = .96), outcome uncertainty management of 3.69 (SD = 1.07), and perceptual uncertainty management of 4.05 (SD = .78).

Personal Uncertainty Management Habits

Evaluator uncertainty representing group profiles were further validated using linear regression. Based on the theoretical assumptions of this study, uncertainty representing typologies should be correlated with personal uncertainty management habits in the international development evaluation context.

Table 17. Uncertainty management means and standard deviations by group.

Uncertainty Management Traits	Conventional Uncertainty Representing Evaluators (CURE)		Heterodox Uncertainty Representing Evaluators (HURE)	
	Mean	SD	Mean	SD
Uncertainty Orientation	4.44	.69	4.60	.64
Personal Perceptual Management	4.03	.51	4.31	.50
Personal Outcome Management	3.48	.86	3.72	.89
Personal Process Management	3.32	.83	3.28	.87
Organizational Expressed Management	3.58	.92	4.01	.96
Organizational Outcome Management	3.38	.96	3.69	1.07
Organizational Perceptual Management	3.69	.72	4.05	.78

Each personal uncertainty management style was regressed on group profile, controlling for individual level factors of uncertainty orientation, gender, years of experience, education (Table 18). Intraclass correlation estimates on the continuous measures for uncertainty representing belief and habits suggest organization explains 15% of the variation in evaluator habits so cluster robust standard errors were used. Overall, the model predicting individual use of perceptual uncertainty management strategies was significant [$F(6, 102) = 5.34$, $p < .001$, adjR^2 = .19]. After controlling for covariates, the HURE group was associated with .41 greater use of perceptual uncertainty management strategies than CUREs [$p = .002$].

A unit increase in uncertainty orientation was also associated with a .21 increase in perceptual uncertainty management strategies [$p = .008$]. This finding indicates that evaluators who are more comfortable with uncertainty are also more comfortable identifying and adapting to changing circumstances to manage uncertainty. In this model, men had a .23 increase in use of perceptual uncertainty management strategies compared to women [$p = .01$]. Similarly, the model for individual use of outcome uncertainty management strategies was significant [$F(6, 105) = 7.03$, $p < .001$, adjR^2 = .25]. Evaluators in the HURE group were associated with .44 greater use of outcome management strategies compared to CURE after controlling for other individual factors [$p = .03$]. Years of experience was negatively associated with outcome uncertainty management strategies, indicating that for each additional year of experience, evaluators use .03 fewer outcome uncertainty management strategies [$p = .006$]. Use of outcome uncertainty management habits was significantly greater in men than women [$B = .31$, $p = .04$].

Finally, the evaluator uncertainty representing model for process uncertainty management strategies was not significant [$F(6, 105) = .42$, $p = .86$, adjR^2 = -.03].

Table 18. Coefficients and standard errors for personal uncertainty management styles.

	Perceptual		Outcome		Process	
	B	SE	B	SE	B	SE
Group						
HURE	.41**	.13	.44*	.20	.02	.22
Uncertainty Orientation	.21**	.08	-.07	.13	-.05	.14
Gender						
Man	.23**	.09	.31*	.15	.12	.16
Experience	.001	.01	-.03**	.01	-.0002	.01
Education						
Masters	-.04	.16	.11	.26	.28	.29
Doctorate	.07	.19	-.49	.31	.12	.35

* $p < .05$
** $p < .01$

Viewed holistically, findings from the three models suggest that evaluator uncertainty representing groups is associated with uncertainty management habits, with HUREs indicating greater use of other uncertainty management strategies than CUREs. Thus, evaluator uncertainty representing groups (i.e., HURE, CURE) is a coherent group structure for testing study hypotheses.

Contextual Influences on Uncertainty Representing Groups

To explore how aspects of organizational and evaluator context influence uncertainty representing evaluator group membership, logit models with covariates for organizational expressed, outcome, and perceptual management, along with individual uncertainty orientation, role, independent consultant, gender, years of experience, and education were tested (Table 19). Education was dichotomized into doctorate and non-doctorate because there were no observations in the 4-year degree cell for the HURE group. To further isolate organizational influences, sector was dichotomized into independent consultants and non-independent consultants with the assumption that independent consultants are more autonomous that evaluators working within an organizational setting. Prior to analysis, an intraclass correlation coefficient for uncertainty orientation ($\rho = .52$) and uncertainty representing habits ($\rho = .15$) within organizations was calculated. Cluster robust errors for organization were included in this model to account for non-independence of observations.

Model one looks at evaluator context in isolation [$\chi^2 (3) = 15.70$, $p = .001$, McFadden's pseudoR^2 = .10]. For each additional year of experience, evaluators have 1.08 greater odds of being in the HURE group [$p < .001$]. Doctoral level education has a larger, but non-significant influence on group membership [OR = 1.16, $p = .77$]. Greater comfort with uncertainty was associated with a non-significant decrease in the odds of being in the HURE group, contrary to what would be expected. The second model includes organizational level covariates [$\chi^2 (8) = 39.95$, $p < .001$, pseudoR^2 = .30].

Table 19. Coefficients, odds ratios (OR), and standard errors (SE) for uncertainty representing group.

Contextual Factors	Evaluator Context			Evaluator & Organizational Context		
	B	OR	SE	B	OR	SE
Uncertainty Orientation	-.10	.91	.48	.25	1.28	.32
Experience	.08***	1.08	.02	.07	1.07	.04
Doctorate	.15	1.16	.53	1.02	2.79	.71
Organizational Uncertainty Management						
Expressed				.26	1.30	.51
Outcome				1.21***	3.35	.31
Perceptual				1.16*	3.19	.54
External				.40	1.50	1.12
Independent				.95	2.58	.71

* $p < .05$

**$p < .01$

***$p < .001$

Once accounting for organizational context, evaluator experience was no longer statistically significant. Perceived organizational use of outcome [OR = 1.21, $p <$ .001] and perceptual [OR = 1.16, $p = .04$] uncertainty management was associated with greater odds of being in the HURE group. When adding organizational level factors, the association of individual uncertainty orientation and group becomes positive, as expected, although remains non-significant in the model.

Uncertainty Habits and Beliefs Gap

Further corroboration of organizational context influence on evaluator uncertainty representation beliefs and habits was explored using linear regression on gap scores (Table 20). The gap between an evaluator beliefs and habits was regressed on individual uncertainty orientation, years of experience, education, perceived organizational uncertainty management styles, role, and independent consultant status. Cluster robust standard errors on organization were used to account for non-independence of observations. Results of model one suggest evaluator context does not significantly influence the gap between beliefs and habits [$F(3, 65) = .79$, $p = .50$, $R^2 = .02$]. Overall, model two had predictive power [$F(8, 65) = 7.95$, $p < .001$, $R^2 = .24$]. Adding organizational factors showed that perceived organizational use of perceptual uncertainty management strategies was associated with a .42 decrease in the gap between beliefs and habits [$p <$ .001]. A gap decrease of .32 was also observed for independent consultants [$p = $ .04]. Evaluator uncertainty representation beliefs and habits more closely align when they work as independent consultants or for organizations using greater perceptual uncertainty management strategies.

Table 20. Coefficients and standard errors for uncertainty representing beliefs and habits gap.

Contextual Factors	Evaluator Context		Evaluator & Organizational Context	
	B	SE	B	SE
Uncertainty Orientation	.09	.10	.05	.08
Experience	-.01	.01	.002	.01
Doctorate	-.07	.16	-.01	.14
Organizational Uncertainty Management				
Expressed			.03	.09
Outcome			-.02	.07
Perceptual			-.42***	.10
External			-.08	.23
Independent			-.32*	.15

*$p < .05$

***$p < .001$

CHAPTER FIVE
CONCLUSIONS AND RECOMMENDATIONS

The present study sets a foundation for investigating representations of uncertainty in the evaluation context. The purpose of this study was to explore the beliefs and habits of international development evaluators toward representing uncertainty in evaluation reports. A new uncertainty representing beliefs and habits scale was also evaluated to measure latent group structures. Finally, this study depicted a new model for understanding the evaluation context in order to explain divergence in the habits and beliefs among groups of evaluators. Findings from this study suggest that overall, international development evaluators are uncertainty-oriented people who believe uncertainty should be represented in evaluation reports. However, their habits are not consistent with their beliefs and a gap exists. This study revealed that this gap can be explained by how evaluators perceive their organization manages uncertainty. Overall, this sets a foundation for research on uncertainty in the evaluation context.

In the current study, we found that representing uncertainty was desirable among evaluators working in the international development context. Generally, they agreed or strongly agreed to each statement about their uncertainty representing beliefs. However, they rated their habits for representing uncertainty lower, creating a gap between habits and beliefs. Habits most closely matched beliefs when it comes to representing conflict and/or inconsistency in the data and using uncertainty representations that protect respondent/informant privacy and ethical considerations. Habits and beliefs diverged most for reporting the costs and benefits of making decisions when irreducible and reducible uncertainty exists. This gap may indicate a need for training or additional experience among international development evaluators. Alternatively, it could

suggest evaluators are constrained in representing uncertainty by the organizational or national context.

Evaluators use a variety of quantitative and qualitative formats for representing uncertainty in reports. The most common formats for representing uncertainty among international development evaluators was confidence intervals and argumentation. Bayes degrees of belief was the least used format. Overall, evaluators use the 12 formats presented in this study half of the time or less in evaluation reports. This finding suggests three possibilities. First, there may be a training gap among evaluators in the international development context for how to represent uncertainty. It is also possible that this survey did not encompass all possible ways to represent uncertainty and therefore did not capture the formats most commonly used. Finally, it is possible, as hypothesized in this study, that evaluators face pressure from the organizational or national contexts not to represent uncertainty even when they believe they should. In other words, negative social representations of uncertainty in the national or organizational context shape evaluator habits.

This study also revealed that international development evaluators can be classified into two groups based upon their uncertainty representing beliefs and habits. Thus, the hypothesis that international development evaluators share common beliefs and habits was not supported. Findings from this study suggest the majority of evaluators share beliefs and habits that result in more limited representation of uncertainty, while a minority group exhibits greater uncertainty representing habits. Confidence in the two-group structure was strengthened by its predictive capacity of personal uncertainty management strategies.

The observed positive association of HURE group membership with outcome uncertainty management strategies was not expected since outcome uncertainty management strategies is theorized to be more constraining (Clampitt & Williams, 2007). Thus, greater use of outcome uncertainty management was expected to have a negative association with uncertainty representation habits. However, managing uncertainty is not the same as

avoiding uncertainty or manufacturing certainty, so I speculate that HUREs are more likely to represent uncertainty in evaluation reports because they are better at managing it and that these outcome uncertainty management skills are developed working among HUREs within organizations characterized by a greater propensity of managing uncertainty.

An intraclass correlation coefficient assessing the degree to which evaluator uncertainty representing habits and uncertainty orientation clustered within organizations indicates considerable commonality exists within this social location. Findings also showed that evaluator perceptions of perceptual and outcome organizational uncertainty management habits positively influenced their beliefs and habits about representing uncertainty after controlling for individual level factors such as experience and education. Working in organizations dominated by CUREs may reinforce beliefs and habits that result in evaluation communications (e.g., reports) conveying less uncertainty, which becomes the organizational norm. Overall, this adds to a body of research on how complexity in the evaluation context impacts an evaluation.

Social Representations and the Evaluation Context

This study also sought to further literature depicting models of the evaluation context. The proposed evaluation context model is characterized by three nested level corresponding to evaluator, organizational, and national contexts. Drawing from previous models, the national context is influenced by historical, political, and socio-cultural factors. The organizational context is influenced by organizational level political factors, as well as program and evaluation factors. Finally, the evaluator context is influenced by education, experience, habits, routines, and beliefs of the evaluator. Social representations of uncertainty exist within each of these levels, influencing the evaluation context as a whole. Social representations among groups working in the evaluation context shape the beliefs and habits of evaluators, while evaluator beliefs and habits shape evaluation communications (e.g., evaluation reports). These

communications in turn, influence social representations that exist within the evaluation context. Of specific relevance to this study, beliefs and habits about uncertainty shape how representations of uncertainty are reproduced.

Answers to the research questions in this study provide initial support for an evaluation context model in which evaluator habits and beliefs about uncertainty in the evaluation context are not only being shaped by the organizational context, but also shaping the organizational context. I argue that these findings suggest social representations shape beliefs and habits. Although 98% of international development evaluators in this sample are uncertainty-oriented people, only 18% cluster within the HURE group. Existence of a two-group structure presented an additional question of how a HURE minority has developed. Social Representations Theory suggests distinct shared knowledge circulating among this group of evaluators due to clustering within the same social location (e.g., organizations, professional groups).

Empirical findings also show that organizational uncertainty management orientation influences whether an evaluator is classified as a CURE or HURE. Evaluators working for organizations perceived as using greater perceptual and outcome uncertainty management strategies had over three times the odds of being in the HURE group compared to the CURE group. This argument is further supported by the finding that perceived organizational use of perceptual uncertainty management strategies is associated with a decreased gap between evaluator uncertainty representing beliefs and habits. The social representations argument that the organizational context shapes the uncertainty representing beliefs and habits of new employees is further supported by correlations showing that greater perceived organizational use of perceptual and outcome uncertainty management strategies was associated with greater individual use of outcome uncertainty management strategies. At the same time, evaluator use of outcome uncertainty management strategies was not associated with an individual's general uncertainty orientation.

Although feedback loops (i.e., bidirectional causality) were not explicitly tested, based on available evidence I argue that evaluators also influence the organizational context. Evaluators who are more uncertainty-oriented have significantly greater use of perceptual uncertainty management strategies. These correlations suggest evaluators who more likely to use perceptual uncertainty management skills (i.e., those who use foresight to change and new ideas) may self-select into organizations with strong propensity for managing uncertainty. Management of uncertainty appear to be associated with greater uncertainty representation. Thus, once evaluators join these organizations, they acquire shared habits for representing uncertainty, as evidenced by a strong clustering effect reported earlier. In other words, these evaluators cultivate an organizational culture of managing uncertainty through perceptual and outcome strategies such that any CUREs subject to the same organizational context would gradually acquire more uncertainty representing beliefs and habits by working in an environment dominated by HUREs.

These data are ambiguous, however, and could suggest an alternative meaning. Independent consultants present a unique case that presents an alternative interpretation for why some evaluators are more likely to represent uncertainty than others. Independent consultants are, on average, 2.5 times as likely to be in the HURE group compared to CURE group and have a smaller gap between beliefs and habits. These findings could also be explained with a professional autonomy model. Independent consultants may have more professional autonomy to represent uncertainty in evaluation reports with fewer organizational constraints on their work. However, the influence of organizational uncertainty management on HURE group membership remains after controlling for independent consultant and external evaluator status still points to a role for social representations as a contextual element that shapes what evaluators believe about the value of representing uncertainty and how it is appropriate to do so. It may be that evaluators who work for organizations characterized by

greater use of uncertainty management strategies are afforded more professional autonomy due to some other unmeasured, yet correlated, factor.

Another counter interpretation to the social representations model of evaluation context is that evaluators in the HURE group are simple more competent due to better education and more experience. In this sample, HURE group members tended to be more experienced and more likely to have doctoral level education. Thus, they may be more familiar with statistics and more experienced in managing projects or client expectations about evaluation findings. Yet, once organizational factors are included in the model, evidence does not support a significant association between HURE group membership or doctoral level education. Moreover, descriptive data show that an evaluator can have substantial experience in the field and a doctoral education, but still be in the CURE group. In fact, 21% of CUREs have a doctoral degree. Thus, I am less confident in the competence explanation and conclude that social representations theory is more useful for understanding uncertainty beliefs and habits within the evaluation context. It also provides a more useful model of the evaluation context more generally.

Limitations

Before drawing conclusions, it is important to note limitations to this study that result in uncertainty about the findings. First, the current study is limited by a research design that is correlational and cross-sectional in nature. Therefore, claims about causality cannot be made, particularly, in relation to the link between organizational context and uncertainty representing beliefs and habits. Representativeness of the sample is unknown since no sampling frame exists for evaluators. Thus, it is possible that certainty-oriented evaluators were under-represented in this sample. Further, this study is limited due to the use of self-report measures and the possibility of social desirability bias influencing evaluator responses. Technical terminology used in the survey was challenging and feedback from three respondents via email suggest some survey items were

unclear. Along with person misfit estimates from the scale, such feedback may be suggestive of response carelessness or cognitive errors. Finally, overall model fit for several scales was lower than desired and may not accurately or precisely measure the intended constructs. Next, I will attempt to delineate reducible uncertainty from irreducible uncertainty.

Reducible Uncertainty

This study cast a wide net to explore evaluator beliefs about, and habits for, representing uncertainty. It provides a foundation to deepen inquiry and sparks many additional questions. Lack of knowledge about several aspects of the proposed evaluation context result in uncertainty that may be reduced with additional data. Results from this study are strong enough to warrant additional research into the beliefs about uncertainty in the evaluation context through qualitative methodologies to clarify the valence of how uncertainty is socially represented. This current study shows evaluators believe uncertainty should be represented, but not the valence with which they believe it should be framed linguistically (e.g., risky, opportunity, costly, temporally acceptable).

Given that the largest group consists of evaluators who are less likely to represent uncertainty and have a greater gap between beliefs and habits, we may expect to find the narratives frame uncertainty about evaluation findings as something risky or costly to the evaluation organization that should not be disclosed. However, an alternative framing or narrative around uncertainty may exist among HUREs. Existence of two potentially different social representations of uncertainty among evaluators and should be explored further. Exploring these areas may help reduce ambiguity in the current data as to whether findings indicate social representations influencing evaluator beliefs and habits or if the professional autonomy and competence explanations should be given more importance.

Irreducible Uncertainty

The exact values for evaluator uncertainty orientation, uncertainty management, and uncertainty representing beliefs and habits will vary from person to person or time to time. Uncertainty resulting from this random variability is irreducible. Unanticipated changes to funding or policy in the international development context could occur during an evaluation resulting in greater or lesser propensity to use certain uncertainty management strategies, including representation. We also cannot be certain of how this research and catalyzing conversations about uncertainty in the evaluation context will ultimately change the social representations of uncertainty among evaluators and other organizational actors. Collecting more data about the beliefs and habits of evaluators toward representing uncertainty or the social representations of uncertainty in the evaluation context would also be unlikely to reduce uncertainty about how the system would change if evaluators more frequently represented uncertainty about evaluation findings or changed the valence with which they framed this uncertainty. Questions would remain about whether instrumental use of evaluations increase or decrease? Would funding for social program increase or decrease? Would the evaluation field become more or less credible? Uncertainty (i.e., ignorance) can be rational and result in social capital and cohesion (Smithson, 1989). Thus, findings from this study are arguably not convincing enough to suggest intentionally changing to how evaluators are trained to think about or manage uncertainty, or a deliberate re-framing of uncertainty in the evaluation context.

Conclusion

Uncertainty and how it is represented influences decision-making. Thus, the uncertainty representing habits and beliefs of evaluators and other actors in the evaluation context likely influence evaluation use/decision making. Therefore, investigating uncertainty representing beliefs and habits can help us understand decision making and evaluation use in the eval context. This study concludes

that most evaluators characterize themselves as uncertainty-oriented individuals and agree that representing uncertainty in evaluation reports is desirable. Yet, a gap between beliefs about representing uncertainty and habits exists that can be explained by organizational context and shared norms within that context. It follows that many evaluation reports are likely to contain findings communicated with a greater degree of certainty than actually exists. As uncertainty managers, evaluators are in a unique role to represent uncertainty about social interventions and work with decision-makers to tolerate it, and even exploit it, toward better outcomes.

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APPENDIX

Appendix A: Country of Origin Table

Table 21. Respondent country of origin

Country	Frequency	Percent
Afghanistan	2	1.0
Albania	1	0.5
Argentina	1	0.5
Australia	3	1.5
Bangladesh	2	1.0
Belgium	1	0.5
Bosnia and Herzegovina	3	1.5
Brazil	2	1.0
Bulgaria	1	0.5
Cambodia	2	1.0
Canada	8	4.1
Cape Verde	1	0.5
China	1	0.5
Cote d'Ivoire	1	0.5
Egypt	1	0.5
El Salvador	1	0.5
Ethiopia	2	1.0
Finland	2	1.0
France	1	0.5
Germany	6	3.1
Ghana	4	2.0
Guinea	1	0.5
India	4	2.0
Israel	1	0.5
Italy	7	3.6
Japan	1	0.5
Jordan	2	1.0
Kazakhstan	1	0.5
Kenya	10	5.1
Korea, South	1	0.5
Lebanon	3	1.5
Lesotho	2	1.0
Macedonia	1	0.5

Table 21 continued.

Country	Frequency	Percent
Malawi	3	1.5
Mali	1	0.5
Mexico	1	0.5
Mozambique	2	1.0
Myanmar (Burma)	3	1.5
Namibia	1	0.5
Nepal	2	1.0
Netherlands	4	2.0
New Zealand	2	1.0
Niger	1	0.5
Nigeria	8	4.1
Pakistan	4	2.0
Peru	2	1.0
Russia	1	0.5
Sierra Leone	1	0.5
South Africa	1	0.5
South Sudan	1	0.5
Spain	1	0.5
Sri Lanka	2	1.0
Sudan	1	0.5
Swaziland	1	0.5
Sweden	4	2.0
Syria	3	1.5
Trinidad and Tobago	1	0.5
Tunisia	1	0.5
Turkey	1	0.5
Uganda	5	2.6
Ukraine	1	0.5
United Kingdom	5	2.6
United States of America	46	23.5
Uruguay	1	0.5
Yemen	1	0.5
Zambia	2	1.0

VITA

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