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TOWARD A COMPREHENSIVE WORLDVIEW MEASURE

By

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## Toward a Comprehensive Worldview Measure

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Worldview is an individual difference construct that has been linked to various behavioral and health outcomes. However, very little is known about how worldviews develop and how worldview beliefs, values, and attitudes coalesce into different worldview factors. One obstacle that has impeded research on worldviews is the lack of a robust worldview measure. The creation of a new, more valid worldview measure will aid in answering these important questions. This research project is the first step in the creation of a more comprehensive worldview measure. The primary aims of Study 1 were to compile existing published worldview measures and reduce the combined items to a parsimonious number necessitated by the large-scale factor analyses used in Study 2. Five published worldview measures were identified, and the combined 160-items were administered in random order to 171 participants from a mid-size, public university. The 160 items were reduced through Exploratory Factor Analysis (EFA) by analyzing (1) communality values, (2) rotated factor loadings, (3) significant cross-loadings, and (4) inter-item correlations, leaving 77 items which formed 8 preliminary factors. Study 2 sought to re-identify and confirm the factors (with an adequate sample size) to ensure that the new measure maintained a meaningful breadth while eliminating any further redundant or extraneous items. Participants ( $N = 772$ ) were recruited through Amazon Mechanical Turk (MTurk). An EFA was run on half of these participants using the same criteria from Study 1 to reduce items. This process resulted in 41 items which formed five factors: Factor 1, benevolence and optimism; Factor 2, secularism; Factor 3, Eastern-based spirituality; Factor 4, hard work; and Factor 5, illusion of free will. The five factors were then analyzed using Confirmatory Factor Analysis (CFA) to see how the model fit the remaining half of participants. The CFI indicated a good fit of the model to the data. However, the RMSEA fell above the suggested maximum value. Taken together, these indices suggest that the model has room for improvement, but is an overall decent fit. This new, 41-item measure, the Comprehensive Worldview Measure (CWM), has significant potential to further worldview research.

## Toward a Comprehensive Worldview Measure

“...worldview is the most important construct that the typical psychologist has never heard of.”

– Koltko-Rivera, 2004, p. 4

A worldview is a set of core beliefs, values, and attitudes about the nature of the universe, the nature of humanity, one’s place in the universe and in their social contexts, and how one should live their life. Worldview beliefs, values, and attitudes are either existential (e.g., how the universe came to be), evaluative (e.g., what constitutes good and just behavior), or proscriptive (e.g., how one should focus their energy; Koltko-Rivera, 2004). Once developed, worldviews are thought to be stable over time and across contexts and inform lower-level, more specific beliefs as well as behaviors (Hedlund-de Witt, de Boer, & Boersema, 2014; Nilsson, 2014a; Koltko-Rivera, 2004; Kearney, 1984). According to worldview theory, all humans are predisposed to have a worldview, as it is a result of human nature and vital for human functioning, especially interacting with one another and providing meaning and purpose in one’s life (Kearney, 1984; Nilsson, 2014a). As Koltko-Rivera (2000) states, “World views are not optional.” He then quotes Sarason (1984) who explains that “...we are possessed by our world view as much as we possess it” (p. 3). The “we” that Sarason refers to represents all of humanity. That is, worldview is not an exclusively Western construct but is instead said to be universally possessed by all humans in order to maintain a meaningful view of life and the world (Shweder, 1995, as cited by Koltko-Rivera, 2000). Nonetheless, the specific beliefs, values, and attitudes of one’s worldview will certainly vary among individuals, especially individuals of differing cultures. In other words, worldviews are “inescapable,

overarching systems of meaning and meaning-making that substantially inform how humans interpret, enact, and co-create reality” (Hedlund-de Witt, 2012, p. 75).

Worldviews are inescapable in the sense that all humans, by virtue of being human, possess worldviews and also in the sense that worldviews surreptitiously shape and are shaped by all of our experiences. In the sections that follow, I explore the construct of worldviews along with leading worldview theories, differentiate worldviews from related constructs, and review notable research on worldviews. Then, I identify gaps and shortcomings in the literature and in current measures of worldviews and propose the creation of a comprehensive worldview measure.

### **The Worldview Construct and Leading Theories**

The idea that worldviews are omnipresent and treated as truths is a core tenet of worldview theory (Ibrahim & Heuer, 2016; Kearney, 1984). Instead of thinking of a worldview as a self-ascribed belief system like religious or political ideologies, it is useful to think of a worldview as a set of “cognitive assumptions” (Kearney, 1984, p. 1) through which all of our experiences are filtered. While worldview beliefs, values, and attitudes can be transmitted explicitly or implicitly, they inform all of our perceptions, cognitions, and behaviors whether or not we realize it (Ibrahim & Heuer, 2016; Kearney, 1984). Thus, it makes sense to refer to worldview beliefs, values, and attitudes as “worldview assumptions.” Much literature has been published that attests to the insidious nature of belief formation and function (see Barrett, 2000; Anderson, 2009; Edling, Rydgren, Sandell, 2016; Dweck, 2000; Blackwell, Trzesniewski, & Dweck, 2007). Though much of philosophical thought is born following deep speculation on the fundamental questions of humanity, life, and the universe, few (if any) individuals have

the luxury of deeply contemplating each and every belief, value, and attitude that together comprise a worldview. Instead, worldviews are largely transmitted in similar ways as implicit beliefs, values, and attitudes. The specific mechanisms and processes of worldview development will be discussed in later sections. Furthermore, even when we do contemplate worldview assumptions, we do so through the lens of our already-present worldview. And, because worldviews largely form and function far from our “sensory periphery” (Quine, 1953), they “cannot be questioned or changed without putting the entire system at stake...” (Nilsson, 2014a, p. 23). Still, worldviews can change through contemplation, exposure to different perspectives or evidence that contradicts one’s existing worldview, or through “powerful life experiences” (Nilsson, 2014a, p. 23), such as experiencing a traumatic loss or moving away from home for the first time (Gutierrez & Park, 2015). More about worldview defense and change will be discussed further in subsequent sections of this paper.

Because worldview assumptions function in one’s everyday life without needing to be explicitly recognized, they are hard to put into words and are thus often not present in day-to-day language, which also makes them harder to observe and assess (Nilsson, 2014a). Due to the difficult nature of identifying the basic assumptions we hold, the dimensions of beliefs, values, and attitudes that worldviews encompass have been theorized based on long-running debates between schools of philosophy, differing cultural and religious beliefs, opposing political beliefs, and so on (Devlin, 2010; Koltko-Rivera, 2004). The most comprehensive (though not absolute) list of worldview dimensions is likely that of Koltko-Rivera (2004), reproduced in Table 1, which is compiled from dozens of contributors to worldview theory, including Nietzsche, Dilthey,

Freud, Jung, Pepper, Kluckhohn, Kelly, Stace, Royce, Wrightsman, Lerner, Maslow, de Ropp, Coan, Sue, Greenberg and colleagues, and more. It certainly could be the case, as future research may show, that some of these proposed dimensions are more fundamental or stable than others. The 42 dimensions listed are separated into seven groups. Note that the options for each dimension are not necessarily mutually exclusive.

Table 1

*Worldview Dimensions Proposed by Koltko-Rivera (2004)*

Human Nature Group	<b>Moral Orientation:</b> Are humans inherently good or evil?
	<b>Mutability:</b> Do humans fundamentally stay the same or can they change?
	<b>Complexity:</b> Are humans complex or simple?
Will Group	<b>Agency:</b> Do humans have free will or is all behavior determined by outside forces?
	<b>Determining Factors:</b> Are humans more influenced by their innate nature with which they are born or by their environment, circumstances, and unique experiences?
	<b>Intrapsychic:</b> Is behavior chosen rationally or are we ruled by irrational or unconscious forces?
Cognition Group	<b>Knowledge:</b> Does truth come from authority, tradition, senses, rationality, science, intuition, divination, revelation, or none of these?
	<b>Consciousness:</b> Is the ego the highest state of human consciousness or is there the possibility of transcending the ego?
Behavior Group	<b>Time Orientation:</b> Is the past, present, or future more important?
	<b>Activity Direction:</b> Should one be focused on inward qualities or outward qualities of the self?

Behavior Group, cont.	<b>Activity Satisfaction:</b> Should one be continuously striving forward or making the most of the current state?
	<b>Moral Source:</b> Do moral guidelines come from humans or from a transcendent force such as a deity?
	<b>Moral Standard:</b> Are moral guidelines absolute or relative to the situation?
	<b>Moral Relevance:</b> Are society's moral guidelines personally relevant to oneself or not?
	<b>Control Location:</b> Are the outcomes of one's life determined by one's own actions, personality, luck, randomness, fate, society, and/or divinity?
	<b>Control Disposition:</b> Do societal forces/institutions work in one's favor, to one's disadvantage, or neither?
	<b>Action Efficacy:</b> Is change made most effectively by direct action, supernatural action, or is there no effective way to take action?
Interpersonal Group	<b>Otherness:</b> Are others intolerable or tolerable?
	<b>Relation to Authority:</b> Is a linear (hierarchical) or lateral relationship among groups better?
	<b>Relation to Group:</b> Is the individual's needs and desires a priority over the group's (individualism), or is the group's needs and desires a priority over those of the individual (collectivism)?
	<b>Relation to Humanity:</b> Is one's in-group superior and deserving of rights and priorities, is it equal to one's out-group, or is it inferior to one's out-group?
	<b>Relation to Biosphere:</b> Are human beings superior to other life on Earth, are they equivalent to other nonhuman animals, or are they equivalent to all other forms of life?
	<b>Sexuality:</b> Is the purpose of sexual activity procreation or pleasure? And is the relationship between sexual partners important to sexual activity or not?

Interpersonal Group, cont.	<b>Connection:</b> Should individuals be dependent on their social groups, independent from their social groups, or interdependent?
	<b>Interpersonal Justice:</b> Are interactions between individuals generally just, unjust, or random?
	<b>Sociopolitical Justice:</b> Are the actions of the greater social and political bodies just, unjust, or random?
	<b>Interaction:</b> Are social interactions for competition, cooperation, or disengagement?
	<b>Correction:</b> Should those who transgress social standards be rehabilitated or face retribution?
Truth Group	<b>Scope:</b> Is truth universal or relative?
	<b>Possession:</b> Do people possess all the truth there is or is there much more to be learned?
	<b>Availability:</b> Is the most truth held by my in-group or is the same amount held by other groups as well?
World and Life Group	<b>Ontology:</b> Is there a spiritual reality to our universe or is everything quotidian matter an energy?
	<b>Cosmos:</b> Did the universe come to be due to random events or because of some transcendent plan?
	<b>Unity:</b> Is there a singular reality in which paradoxes and conflicts are transcended or are there may different and conflicting realities?
	<b>Deity:</b> Is there a singular, omnipotent and omnipresent god; human-like god, gods, or goddesses; no way to know of simply unsure if there are deities or not; or no deities at all?
	<b>Nature-Consciousness:</b> Is the natural, nonhuman world conscious or not conscious?
	<b>Humanity-Nature:</b> What is the relationship humanity and nature should have? Subjugation of humans by nature, harmony between the two, or mastery of nature by humans?
	<b>World Justice:</b> Is the world just, unjust, or neither and simply random?

World and Life Group, cont.	<b>Well-Being:</b> Does knowledge about how to further well-being come from science and logic or from a transcendent force?
	<b>Explanation:</b> Can events be explained through formism (because of a class or category), mechanism (as a result of cause-and-effect chains), organicism (because of organic processes), and/or contextualism (because of the context)?
	<b>Worth of Life:</b> Is life worthwhile and are individuals able to find fulfillment and society able to progress, or is life inevitably headed for deterioration?
	<b>Purpose of Life:</b> Is the purpose of life survival, pleasure, belonging, recognition, power, achievement, self-actualization, and/or self-transcendence, or is there no purpose of life?

Clearly, a worldview is a massive construct and thus difficult to conceptualize. To begin unpacking this construct, let us compare worldview assumptions with non-worldview beliefs, values, and attitudes. Though the list of worldview assumptions listed in Table 1 is extensive, not all beliefs, values, and attitudes are worldview beliefs, values, and attitudes. Worldview assumptions are only those beliefs, values, and attitudes that are existential, evaluative, or proscriptive in nature (Koltko-Rivera, 2004). Still, it is difficult to draw a hard line between what is and what is not a worldview assumption.

Theoretically, factual, empirical topics such as physics and mathematics are objective and can be proven or disproven. However, beliefs regarding the source and scope of truth and knowledge (see the Knowledge dimension of the Cognition group and the Truth group in Table 1) are worldview assumptions. Furthermore, while evolution is a scientific concept borne out of scientific research, one’s belief in evolution could be considered a worldview assumption because it involves existential subject matter. Therefore, it is more useful to conceptualize beliefs, attitudes, and values on a continuum that ranges from “certainly a worldview assumption” to “certainly not a worldview assumption.”

To further conceptualize the worldview construct, we can liken it to another enormous psychological construct that is more well-known: personality. Personality is a very large subfield of psychology, and many studies in personality psychology are featured in media and are well-known by the public. Tests that categorize individuals into different personality types such as the Big Five Inventory (John, Donahue, & Kentle, 1991) are commonly administered in schools and in the workplace and are also widely available for anyone to take online. Though personality is a vast concept involving an individual's behaviors, preferences, and aptitudes (just to name a few features), it is still understood (at least in part) and practically utilized by researchers and the general public alike. Nonetheless, personality is such a large construct that it is difficult and perhaps even impossible to administer a measure that assesses all the known features that constitute a one's personality. Similarly, measures of worldviews typically focus on a handful of dimensions that are theorized to be more fundamental or influential in an overall worldview than other proposed worldview dimensions.

Not only are worldviews and personalities both complex, pervasive, and surreptitiously influential, some have even argued that they are part of the same psychological construct. While personality, as a construct, is often used synonymously with personality traits, such as extraversion or neuroticism, traits themselves are only part of one's personality. Personality traits, historically, have been over-emphasized in personality psychology – perhaps because they are innately easier to conceptualize and measure than other aspects of personality. Nilsson (2014a) argues that worldviews are the other, neglected element that, together with traits, make up personality. While traits describe how a person is (the objective side of personality), one's worldview describes

what they believe and value (the subjective side of personality). Traits and worldview assumptions are so interrelated that it can be tricky to differentiate between the two. Take conscientiousness, for example. In the Big Five (Goldberg, 1990), conscientiousness is defined as both a behavior (being careful and vigilant) and as a value (desiring to work hard and fastidiously). Truly, worldview assumptions seem to be inseparable from personality. The whole person cannot hope to be understood (the task of personality psychology) by only considering their objective traits. As Nilsson (2014a) puts it, it is dubious if “anything can even be called a person at all, and thus be ascribed a personality” if one is completely governed by one’s inherent nature (traits), instincts, and environmental confines (p. 19). Thus, it is reasonable to assume that worldviews and traits are inextricably linked to one another, each influencing the other so as to maintain a cohesive personality.

Considering the immense number of belief structures, values, and attitudes that worldviews encompass, some argue that worldviews are too unwieldy and encompassing to be a justifiable psychological construct. However, just as personality research has shown that a vast number of traits can be better understood as a unified personality, so too can a person’s beliefs, values, and attitudes be better understood as a unified worldview. Perhaps this is because worldview assumptions tend to be internally consistent and generally make logical sense with one another (Kearney, 1984). For example, it would be more likely that an individual simultaneously values an egalitarian society and believes no one is innately deserving of more power than others.

On the other hand, there is much evidence that beliefs, like personality traits, can be quite inconsistent and contradictory (Fraley, 1984; Levi, 1944; Nickerson, Barch, &

Butler, 2018). One explanation of such inconsistencies can be found in moral development theory. Kohlberg's theory of moral development details an individual's transition from simplistic and one-dimensional moral understanding and guidelines to more nuanced moral guidelines that accommodate the complex social world in which we live. According to Kohlberg's theory, moral development is "continually directed toward increasing equilibrium" (Turiel, 1974, p. 15), meaning that there is more consistency within the moral guidelines as well as more compatibility between the guidelines and the individual's environment. Kohlberg outlined six stages of moral development. Some individuals move through the stages more quickly than others, and some individuals never reach the higher levels of moral judgement, particularly stage 6 (Colby et al., 1984). While Kohlberg described moral development as a one-directional path through the moral stages, he observed that participants often seemed to temporarily regress and show increased contradiction at various points throughout their moral development. Turiel (1974; 1977) investigated these perceived regressions and concluded that they were due to disorganization or disequilibrium. Disorganization results from perceived contradictions and shortcomings within one's moral guidelines that remain unresolved and can even result in a regression in the stages of moral development (Turiel, 1977). However, disequilibrium is necessary to progressing in the stages of moral development. First, the individual finds their current moral guidelines inadequate in dealing with the moral situations that the individual encounters, which leads to greater disequilibrium in moral decisions and evaluation (thus the apparent regression in moral development). Only after the individual has doubted and then rejected their old, insufficient moral

guidelines can they construct a more internally consistent and environmentally compatible set of moral guidelines and move into the next stage of moral development.

Thus, we expect the most developed worldviews to be made up of interrelated beliefs, values, and attitudes and function as a cohesive unit. However, just as an individual's personality can be highly nuanced or even seemingly contradictory, so too can even the most developed worldview. For instance, one may believe that fate is predetermined, yet also believe that someone who dies from an overdose is responsible for their own death. This individual may be more committed to one of these seemingly contradictory beliefs over the other, or the beliefs operate in different domains of one's life and thus the individual is never forced to choose between them. What matters is that the worldview has some semblance of cohesion to the individual so as to minimize cognitive dissonance (Festinger, 1957) and to allow the individual to effectively interact with their social world (Kearney, 1984; Nilsson, 2014a).

### **Distinguishing Worldviews from Other Related Constructs**

**Social axioms.** A construct closely related to worldviews is social axioms. In fact, these two constructs are so interrelated that they can be thought of as nested within one another. Social axioms, like worldviews, are “generalized beliefs” about the world that transcend contexts and vary among individuals (Leung & Bond, 2004). However, social axioms have a narrower definition than worldviews. While worldviews include beliefs, values, and attitudes, social axioms explicitly do not include values or attitudes (Leung et al., 2002). Furthermore, social axioms are specifically social beliefs that ascertain a relationship between two entities. For example, “belief in religion makes people good citizens” and “powerful people tend to exploit others” are both social axioms from the

Social Axiom Survey (SAS) (Leung et al., 2002). Other statements, such as “people are inherently good” would be considered worldview beliefs, but not social axioms. Thus, social axioms can be thought of as specific kinds of worldview beliefs. Social axioms and the accompanying SAS were developed with the intention of providing a belief-focused counterpart to the World Values Survey. To ensure the cross-cultural validity of the survey, the SAS was developed and utilized with data from more than 40 countries. Worldviews are often operationalized as social axioms in research and measured with the SAS. However, it is inaccurate to say that a worldview is interchangeable with social axioms. Nonetheless, the work that has been done with social axioms and the SAS provide inspiration and ideas for what can be done with cross-cultural worldview research, especially with a more robust worldview measure.

**Culture and religion.** Because belief structures are largely informed by culture, the conversation about systems of beliefs tend to revolve around cultures and their systems of beliefs, or the “cultural worldview.” However, worldview is distinct from culture and should not be used interchangeably, as it sometimes is. The clearest difference between a worldview and a culture<sup>1</sup> is the level of analysis. Cultures are shared by groups of individuals, but “the individual, or self, [is] the axis of worldview” (Johnson, Hill, & Cohen, 2011, p. 142). Furthermore, though cultures have their own cultural worldview (the dominant worldview held by cultural group members; Hedlund-de Witt, Boer, & Boersema, 2014), they also include cultural practices and traditions, such as food, clothing, and holidays. On the other hand, worldview, a purely psychological construct, does not include such practices and traditions. However,

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<sup>1</sup> Culture as it is used here is defined as “people who are existing within some kind of shared context” (Heine, 2012).

worldviews are partly transmitted and acquired through cultural practices and traditions. For example, suppose a certain cultural worldview has a belief that elders should be those most respected and powerful in the community. This culture expresses this belief through various practices, such as bestowing the eldest community member with an important governmental position. Such practices could implicitly teach young members of this culture to also hold this belief that elders are powerful and ought to be respected by observing this tradition. Culture, including the cultural worldviews and the practices and traditions, both influences and is influenced by individual worldviews, but because of practices and traditions as well as the focus on groups of individuals, culture is distinct from worldview. Furthermore, though a worldview is certainly informed by one's cultural context, one's worldview is not completely dependent on their cultural context. Worldview varies within as well as among cultures (Hedlund-de Witt, de Boer, & Boersema, 2014). Worldview is distinguishable from religion for comparable reasons as culture. While it could be argued that religion does not necessitate other individuals (that is, that a single person could have their own religion), religion includes some artifacts, institutions, and practices that worldviews do not entail (Call, 2012).

**Schemas.** Schemas are also often conflated with worldviews. Though they do share some superficial similarities, upon close examination, the two clearly represent distinct constructs (Koltko-Rivera, 2004). A schema and a worldview are both cognitive structures that provide templates with which to approach and interpret the world, the scope of the two constructs is clearly different. An individual possesses innumerable schemas which are employed constantly across all sorts of scenarios so as to free up our precious cognitive resources for other conscious processes. For example, a schema of a

grocery store allows an individual to efficiently maneuver through it, engage with the employees and other customers in an appropriate manner, and satisfy the individual's need for food. Worldview assumptions also inform our behaviors and interpretations of various scenarios, but, unlike schemas, they are based in existential, evaluative, and proscriptive beliefs. As Jinkerson (2016) puts it, "Like relational schemas, worldviews operate at an implicit level and act as cognitive filters. However, worldviews are more foundational than even self-schemas, as they relate to understanding existence" (p. 64). So, one's worldview assumptions would inform an individual's choice of cage-free eggs and how politely they will engage with the cashier. Furthermore, schemas are formed purely through first-hand experiences, whereas worldview formation results from experience as well as cultural transmission. Schemas are also much more easily disproven than worldviews, and when schemas are disproven, the results are much less emotionally and mentally significant than when an individual finds holes in their worldview (Koltko-Rivera, 2004). It is true that the schema construct could be (and has been) over-extended to include abstract concepts such as ideologies or religious beliefs in which case worldviews could be viewed as "the ultimate parent schema" (Koltko-Rivera, 2004, p. 25). However, for the sake of specificity, I shall retain the distinctions between schemas and worldviews so as to focus on the abstract and theoretical dimensions that worldviews encompass.

### **Worldview Research**

**Behavior.** Why is the study of worldviews an important endeavor? One reason is that worldviews provide possible explanations of human behavior. Let us briefly return to our use of personality traits as a counterpart to worldviews. Despite the popularity of

personality psychology, recent research has shown that an individual's personality traits are not as stable or consistent as previously thought, and that they indeed depend on the context (Ardelt, 2000; Mischel & Shoda, 1995; Uher, 2008). For example, an introvert may display extroverted behaviors in some circumstances while showing introverted behaviors in other circumstances. Perhaps it is the case that personality traits, although easier to define and observe, are not as useful in predicting behaviors and longitudinal outcomes as we had thought. Because personality traits are contingent upon context, it may be useful to look toward another construct, like worldviews, to better predict behaviors and longitudinal outcomes. Indeed, the impact of beliefs on behavior has long been established. For example, individuals who have a stronger belief in a favorable future (BFF) take fewer actions to support a cause that they believe in because they believe it will occur with or without their direct support (Rogers, Moore, & Norton, 2017). BFF and its behavioral outcomes occur across cultures and could certainly be interpreted as a worldview assumption relating to the Behavioral and Truth dimensional groups listed in Table 1. Furthermore, social axioms, previously established as specific types of worldview beliefs, are predictive of styles of conflict resolution, vocational choice, coping styles, and suicide indicators (Bond et al., 2004; Lam et al., 2010).

Indeed, worldviews have shown much promise in predicting and explaining behavior. For example, worldviews that focus on inner growth and contemporary spirituality alongside pro-environmental attitudes are related to a higher frequency of sustainable behaviors than worldviews that focus on traditional god, money, or secular materialism (Hedlund-de Witt, de Boer, & Boersema, 2014). Additionally, Indonesian communities of individuals with more religious worldviews take fewer steps toward

adaptation following a natural disaster (e.g., creating evacuation routes) than individuals with more secular worldviews (Call, 2012). This may be because individuals feel less motivation to make these adaptations and instead trust in their deity to protect and care for them. Thus, as the post-disaster adaptation example demonstrates, worldviews have important implications for behavior as well as well-being.

**Mental Health.** Furthermore, certain kinds of worldviews may be predictive of mental health. A study by Walker, Alabi, Roberts, and Obasi (2010) demonstrated worldviews are a moderating factor for certain proxies of depression, such as the Reason for Living Scale. Specifically, African Americans who reported a less African-centered worldview (that is, endorsing fewer beliefs in areas such as spiritualism and communalism) also reported fewer reasons for living as hopelessness increased, and African Americans who reported a more African-centered worldview reported less justification to live as depressive symptoms increased. These differing worldviews significantly predicted subtle differences in individuals' responses to hopelessness and depressive symptoms, which has serious implications for clinical practice and research. Research on veterans experiencing PTSD also demonstrates the impact of different worldview assumptions. In a series of studies, those who believed humans were permanent and unchanging (the Mutability dimension of the Human Nature group in Table 1) as well as those who were more individualistic in their relationship to group beliefs, values, and attitudes (Relation to Group dimension of the Interpersonal group in Table 1) had higher PTSD symptoms. Moreover, Relation to Authority predicted a myriad of mental health variables. Individuals with lateral relationships with authority had greater hindsight bias, feelings of guilt, anxiety, and PTSD and lower subjective

meaning in life than those with linear relationships with authority (Jinkerson, 2016). So, those who believed humans to be more permanent, those who endorsed individualistic beliefs, and those who had lateral relationships with authority all experienced greater PTSD symptoms. This research harkens back to Dweck and Leggett's (1988) research on perceived helplessness (closely related to the mutability dimension) and various negative psychological consequences. Clearly, mental health outcomes are impacted by several worldview dimensions, including the dimensions of the Human Nature and Interpersonal groups listed in Table 1. The health impacts of worldviews make it an important area of study for psychology as well as medical science, sociology, anthropology, and other disciplines.

**Social group functioning.** Furthermore, studying worldviews can provide insight into why societal groups function as they do. Social psychology tells us that individuals with similar worldviews attract one another and form shared cultural and religious worldviews (Johnson, Hill, & Cohen, 2011). Thus, cultures and other societal groups have their own dominant worldviews (Ibrahim & Heuer, 2016) which both influence and are influenced by the individual worldviews of their members in a bi-directional relationship. For example, individuals within cultures that promote hierarchical and individualistic worldview assumptions (see the Interpersonal group in Table 1) show a higher preference for risk-taking behaviors, whereas individuals within cultures that promote egalitarian worldview assumptions are likely to be anti-risk (Dake, 1991). These risk-taking attitudes have implications for health, cultural norms, and overall societal well-being. Furthermore, as a whole, worldviews become more liberal and secular as cultures become more prosperous and more conservative and religious in economic

downturns (Johnson, Hill, & Cohen, 2011), providing more evidence for the bi-directional relationship between cultural and individual worldviews.

Worldviews also provide very unique and valuable insight into tensions between societal groups, such as political polarity, religious extremism, and prejudice. For instance, individuals become more rigid in their worldviews and less tolerant of others' worldviews under certain circumstances (Greenberg & Arndt, 2011). When individuals are reminded of death, for example, they cling more tightly to their worldviews and are less tolerant of differing worldviews (Greenberg & Arndt, 2011). This phenomenon is explained by Terror Management Theory (TMT). The basic principle of TMT is that humans rely on worldviews to combat the existential threats which all humans are faced with simply by virtue of being human. These basic existential threats (commonly called the existential givens) include death, isolation, identity, freedom, and meaning (see Koole, Greenberg, & Pyszczynski, 2006 for a more in-depth explanation). Worldview plays an especially crucial role in managing the existential given of mortality. The fact that we are animals hardwired to avoid death but also humans capable of recognizing our mortality sets us up for terror "which must be managed continuously" (Greenberg & Arndt, 2011, p. 402; Greenberg, Pyszczynski, & Solomon, 1986). This is where worldviews come in, imbuing "external reality with order, stability, meaning, and purpose" and offering ways in which people can endure after death, literally, symbolically, or both. Thus, existential terror is effectively managed by faith in one's worldview (Greenberg & Arndt, 2011, p. 402; Greenberg, Pyszczynski, & Solomon, 1986). When one's worldview is threatened, death thoughts become more accessible (as measured by an ambiguous word-completion task), and when reminded of the existential

given of death (by having participants think of cemeteries, for example), individuals are more extreme and rigid in their worldview beliefs and show less tolerance for differing worldviews (that is, greater negative out-group bias; Greenberg & Arndt, 2011).

Individuals who believe in literal immortality are less susceptible to these mortality salience manipulations than those who do not (Ai et al., 2014). Furthermore, following a mortality salience task, individuals increased their report of religious beliefs regarding the afterlife (Ai et al., 2014). This is further evidence that different worldviews differentially shape our experience of reality and that worldviews are utilized to manage existential terror. Because of the worldview rigidity that follows mortality salience manipulations, TMT provides insights into stereotyping, reactions to the handicapped, art, politics (including radicalization and affinity toward charismatic leaders) and much more (Greenberg & Arndt, 2011). In general, mortality salience leads to more in-group favoritism, but there are some protections against this negative outcome. As Greenberg and Arndt (2011) explain, “When one’s worldview prescribes prosocial behavior, flexible thinking, or tolerance and compassion, constructive responses to the human existential predicament are likely” (p. 412). In other words, one will still cling tightly to their worldview under existential threat, but the worldview assumptions themselves can mitigate potential negative consequences.

**Multi-disciplinary utility.** Another reason why worldview study is worthwhile is that the worldview construct has the potential to integrate “various disciplines when applied to real life problems” as worldviews impact many different fields and areas (Call, 2012, p. 10). As mentioned previously, worldview theory and research come from a wide range of disciplines, including anthropology, philosophy, and, of course, psychology.

Thus, worldviews provide insight into other constructs which straddle multiple domains, such as culture and religion. For example, historians and anthropologists can use worldviews to investigate the belief structures of groups and individuals, even when these beliefs are non-religious, something that has historically been difficult to do so, as academics have long only had measures for religious belief structures (Johnson, Hill, & Cohen, 2011). Additionally, using the worldview construct can help us understand when and why multiple worldviews would coexist, merge, take over another worldview (acculturation), or clash and result in conflict (Johnson, Hill, & Cohen, 2011). This is extremely relevant today, as “It has become increasingly evident that clashing worldviews ... lie at the root of most, if not all, environmental conflicts” (Devlin, 2010, p. iii). Yet, worldviews are still largely ignored in environmental issues and other fields (Devlin, 2010). Alongside biological, economic, and political considerations, addressing differing worldviews would aid in the resolution of environmental and other kinds of conflicts. For example, Native Americans and European Americans have a long history of conflicts stemming from differing worldviews. When whaling of endangered grey whales was universally banned in the Puget Sound area of Washington state, the Makah tribe, who had a long tradition of whaling, complied (Marker, 2006). However, when the grey whale population rebounded in 1999, the Makah were given permission to hunt and kill a single grey whale. The killing of this grey whale was met with enormous backlash from environmental activist groups who viewed all whaling as unethical and harmful to the environment (Marker, 2006). Discourse between the Makah and the U.S. government that acknowledged and accommodated differing worldviews allowed for the initial agreement that let the Makah to hunt one grey whale. This agreement fit in with

the worldviews of both sides, protecting both the whale populations and the Makah traditions. However, the environmental activist groups, upon hearing of the agreement between the Makah and the government, were enraged, as their worldview suddenly felt threatened. Thus, the absence of worldview discourse led to the ensuing backlash from the environmental groups.

Other conflicts between ethnic groups were more successfully resolved when care was taken to acknowledge and account for their differing worldviews. For example, the Great Bear Rainforest Agreement between the First Nations of Canada and the Canadian government protected both sides' interests and helped resolve a decades-long land use conflict (Saarikoski, Raitio, & Barry, 2013). As previously mentioned, worldviews are staunchly defended when threatened, so more progress can be made tackling issues such as intergroup conflict when all worldviews are considered and protected as much as possible (Nilsson, 2014a; Greenberg & Arndt, 2011). Crafting legislation, media campaigns, and negotiations inclusive of differing worldviews will lead to more buy-in from all sides. On the other hand, discrediting or threatening one's worldview will lead to more resistance and conflict.

### **Gaps in the Literature**

Although worldview show great theoretical and empirical promise as a psychological construct, critical gaps still remain in our knowledge of worldviews. First, research on worldviews has demonstrated the relationship between individual worldview assumptions and various behavioral and health outcomes, but whether or not these individual worldview assumptions and dimensions coalesce in a meaningful way is still unknown. In other words, it is still yet to be fully investigated whether the worldview

construct as a whole is more useful than considering each of the individual dimensions in isolation. Second, even if we conclude that worldviews are a valid construct, we know very little about how worldviews develop. These two important questions will be discussed at length below.

**Is Worldview a Valid Construct?** Despite the large amount of research conducted on worldviews, it is still difficult to conclude whether or not worldview is a valid construct. It certainly may seem more straightforward to focus research on individual beliefs, values, and attitudes rather than this complex construct. Indeed, researchers often (and rightfully so) opt to focus on a specific worldview dimension (or a select group of dimensions) rather than individuals' multidimensional worldviews. For example, researchers may choose to investigate if there is a relationship between the Truth dimensions in Table 1 and years spent in continuing education or the Ontology dimension and spiritual practices. These are certainly interesting and valid research questions in their own right. So, is there theoretical and practical value in considering the cohesive worldview construct? Indeed, the nature of human beliefs are complex and non-parsimonious (Koltko-Rivera, 2000). Thus, it seems difficult to propose that the individual worldview dimensions would be as informative of individual behavior, mental health, and social group functioning as the complete worldview.

One obstacle that is preventing us from concluding whether or not worldview is a valid construct is the lack of consensus on a definition and measure of worldviews. While worldview is still an under-studied topic, there already exist several worldview measures. These measures vary considerably on the dimensions that they encompass and have serious psychometric issues, such as low reliability, low total variance explained, and a

lack of validation tests. Additionally, most published worldview measures use a two-factor model that contrasts two opposing worldviews, such as Humanism and Normativism (Nilsson, 2014b) and dangerous versus competitive worldviews (Perry & Sibley, 2010). However, because of the multitude of factors that contribute to a worldview, a more comprehensive and logical approach is a multi-factor model (Koltko-Rivera, 2004). Indeed, worldviews can be better understood in all their nuances if several dimensions are considered rather than placing individuals in one of two boxes and thus eliminating all their nuances. As Devlin (2010) puts it, “These one-dimensional models are not inherently invalid, they are simply rather limited in scope and use” (p. 21). Furthermore, results from several studies on unidimensional models suggest that they could and should be broken down into further dimensions (Devlin, 2010).

The multidimensional measures of worldview, though more comprehensive, also have their own issues. Most neglect at least one fundamental worldview dimension, such as ontology or epistemology, which presents a construct validity issue (Jinkerson, 2016). Also, these measures still have sub-par item alpha levels, reliability, or total variability explained. See Table 2 for the five worldview measures analyzed in the present study along with their uses, dimensions, factors, and limitations, and see Appendix E for additional tests conducted on these measures using data from this research project. Clearly, more work needs to be done to address these issues and create a more reliable, valid, and statistically strong measures of worldviews.

The proposed research project is the first step in the creation of a new worldview measure that will address these issues. As mentioned previously, enormous constructs like personality traits and worldviews simply cannot be comprehensibly measured within

a single scale. This is the “catch-22” of worldview research (and “nearly all disciplines”): “achieving a balance between comprehensiveness and practical utility” (Devlin, 2010, p.10). Thus, the ideal worldview measure covers – and covers well – the most fundamental dimensions. Most measures define these “fundamental dimensions” based on a top-down approach. However, this comes with its own limitations. As Koltko-Rivera (2000) explains,

The top-down approach taken by some previous investigators is one in which a priori logical considerations, professional inclinations, or purely personal interests dictated the shape of their models of world view. Such an approach left large gaps in those models. A bottom-up, synthetic approach seems likely to yield a more comprehensive conceptualization. (p. 371)

The proposed research project seeks to balance the top-down and bottom-up approaches by simultaneously analyzing several worldview measures in conjunction. This will allow the researcher to capitalize on the theoretical considerations of several researchers as well as provide more variability in the items and dimensions they represent than the individual measures could do on their own. This combination of measures will also allow the researcher to reconcile the different factor structures of the initial measures with each other. Then, this stronger measure can be used to predict different mental and physical health outcomes, behaviors, societal functioning, and more. In addition, a child-friendly version of this new worldview measure can be created, allowing for more developmental research to be done.

Table 2

*Selected Published Measures of Worldviews*

Justification for Creation/Intended Uses	Dimensions Identified by Authors	Factors Identified in Factor Analyses	Limitations
<b>Scale to Assess Worldviews (SAWV) (Ibrahim &amp; Kahn, 1982; Ibrahim &amp; Heuer, 2015)</b>			
Designed to identify differing worldviews of diverse clientele in counseling settings and thus tailor treatments to align with their worldviews	<ul style="list-style-type: none"> <li>• Human nature</li> <li>• Interpersonal relationships</li> <li>• Nature</li> <li>• Time</li> <li>• Activity</li> </ul>	<ul style="list-style-type: none"> <li>• Optimistic worldview</li> <li>• Pessimistic worldview</li> <li>• Here-and-now worldview</li> <li>• Traditional worldview</li> </ul>	<ul style="list-style-type: none"> <li>• Developed using a convenience sample of U.S. college students, so generalizability is an issue</li> <li>• Cronbach's alpha levels are below .70 for three out of the four factors</li> <li>• No analyses of criterion or discriminant validity were conducted</li> <li>• No test-retest reliability analyzed</li> </ul>
<b>Conflicting Worldviews Questionnaire (CWQ) (Devlin, 1995)</b>			
Designed to be a more comprehensive measure of worldviews by including human nature, society, and nature dimensions and by including multipolar options within each dimension, rather than bipolar options as other measures do	<ul style="list-style-type: none"> <li>• Agency</li> <li>• Communion</li> <li>• Super/subordination</li> <li>• Association/dissociation</li> <li>• Resiliency or brittleness of nature</li> <li>• Nature as benign or hostile</li> </ul>	<ul style="list-style-type: none"> <li>• Arcadian worldview</li> <li>• Imperial worldview</li> </ul>	<ul style="list-style-type: none"> <li>• Construct validity issues, as several dimensions are missing from this measure, most notably metaphysical beliefs</li> <li>• Developed using a convenience sample Canadians, so the data might not be generalizable to other populations</li> <li>• Only 23% of the variance in participants' responses is explained by the factor solution</li> <li>• Scarce criterion and discriminant validity analyses, CWQ scores only consistently correlated with political affiliations</li> <li>• No test-retest reliability analyzed</li> </ul>

Table 2 (cont.)

*Selected Published Measures of Worldviews*

Justification for Creation/Intended Uses	Dimensions Identified by Authors	Factors Identified in Factor Analyses	Limitations
<b>Worldview Assessment Instrument (WAI) (Koltko-Rivera, 2000)</b>			
Designed for use in clinical settings, with the intention of tailoring treatment to better fit clients' worldviews	<ul style="list-style-type: none"> <li>• Agency</li> <li>• Mutability</li> <li>• Locus of responsibility</li> <li>• Relation to authority</li> <li>• Relation to group</li> <li>• Metaphysics</li> </ul>	<ul style="list-style-type: none"> <li>• Agency</li> <li>• Mutability</li> <li>• Locus of responsibility</li> <li>• Relation to authority</li> <li>• Relation to group</li> <li>• Metaphysics</li> </ul>	<ul style="list-style-type: none"> <li>• Missing key dimensions of worldviews, including the Behavioral group of Table 1, presenting a construct validity issue</li> <li>• Constructed and validated on samples of convenience in the United States</li> <li>• Cronbach's alpha levels were below .70 for four out of the six factors</li> <li>• Only 35.9% of variance in sample explained by final factor structure</li> <li>• No analyses of criterion or discriminant validity nor test-retest reliability analyzed</li> </ul>
<b>Integrative Worldview Framework (IWF) (Hedlund-de Witt, de Boer, &amp; Boersema, 2014)</b>			
Intended to measure worldviews as they relate to environmental psychology, so an anthropology dimension (what is the role and position of the human in our universe) and a societal vision dimension (how society should be organized and how issues should be addressed) are included	<ul style="list-style-type: none"> <li>• Ontology</li> <li>• Epistemology</li> <li>• Axiology</li> <li>• Anthropology</li> <li>• Societal vision</li> </ul>	<ul style="list-style-type: none"> <li>• Inner growth</li> <li>• Contemporary spirituality</li> <li>• Traditional god</li> <li>• Focus on money</li> <li>• Secular materialism</li> </ul>	<ul style="list-style-type: none"> <li>• Developed using a Dutch sample, so needs to be reanalyzed with samples from other cultures</li> <li>• No measure of internal consistency (like Cronbach's alpha) analyzed</li> <li>• 46% of variance in participants' responses is explained by the factors</li> <li>• No test-retest reliability analyzed</li> </ul>

Table 2 (cont.)

*Selected Published Measures of Worldviews*

Justification for Creation/Intended Uses	Dimensions Identified by Authors	Factors Identified Following Factor Analyses	Limitations
<b>Connection of Soul (COS) Scale (Ai et al., 2014)</b>			
Designed to address worldview beliefs regarding life after death, which are missing from other worldview measures even though they are fundamental worldview assumptions, especially considering the strong relationship between worldview and the existential given of death.	<ul style="list-style-type: none"> <li>• Secular view of death</li> <li>• God-centered view of death</li> <li>• Cosmic-spiritual view of death</li> </ul>	<ul style="list-style-type: none"> <li>• Secular view of death</li> <li>• God-centered view of death</li> <li>• Cosmic-spiritual view of death</li> </ul>	<ul style="list-style-type: none"> <li>• Considers the three different views of death to be their own worldview dimensions, when other worldview theorists would likely argue that they are more like three different options to a singular dimension</li> </ul>

*Note.* Measures are listed in order of initial scale publication year. Cronbach's alpha is a measure of reliability for measures.

Typically, it is recommended that Cronbach's alpha be at least .70 (Ai et al., 2014).

**How do Worldviews Develop and Change?** Assuming that worldview is a valid construct, then another major question that remains to be answered is how worldviews develop and change. While there exists much literature on the formation of specific beliefs and attitudinal change, it remains to be seen if and how these findings extend to worldviews (Koltko-Rivera, 2004). Several theoretical models of worldview development and change have been suggested. Gabora (2006) proposes a cognitive model of worldview formation, wherein memories are interconnected to form a cohesive worldview. Perceptions, thoughts, feelings are interpreted by and mapped onto a network of memories which forms the worldview. The worldview is then continuously revised as new experiences are assimilated with the network. Gabora argues that worldviews are necessarily created so as to make sense out of the deluge of perceptions, thoughts, and feeling we experience, and that it is these very experiences that are strung together in a series of continuously more abstracted iterations that form the worldview.

Moving from the cognitive realm and into the social realm, the content of an individual's worldview is likely a combination of cultural worldview assumptions and worldview assumptions born out of personal experiences (Ibrahim & Heuer, 2016), particularly interactions with "other humans, early caregivers, social institutions (e.g., school), and the environment..." (Johnson, Hill, & Cohen, 2011, p. 144). Worldviews likely start to form in infancy, when we develop "beliefs and expectations about the self and the social world, as well as values, which start emerging long before the person can consciously and deliberately construct meaning..." (Nilsson, 2014a, p. 26). To confirm all these theories and ideas about worldview formation, we need much more longitudinal and quantitative data (Nilsson, 2014a).

However, there has been some empirical research done on worldview development. Specifically, cross-cultural studies by Bukowski and Sippola (1998) suggest that children develop their worldviews in the same way across cultures, meaning that the psychological processes and structures for worldview development are fundamental and universal. However, the content of the children's worldviews differs, reflecting the broader cultural worldview. This divergence in worldview assumptions likely starts in infancy when children are developing self-awareness and learning the self-other distinction, which varies widely between individualistic and collectivistic cultures (Bukowski & Sippola, 1998). Bukowski and Sippola also cite research by Keller et al. (1998) which shows "that children from China, Iceland, and Germany resolve moral dilemmas differently as a function of the variations in social goals across these cultures" (1998, p. 744). Some research has even demonstrated how different developmental factors shape one's worldview. For example, adolescents who have dysfunctional families (as measured with the Family Assessment Device) have higher levels of social cynicism present in their worldviews (Wong et al., 2010). As the authors point out, the how and why of worldview developmental are starting to become clearer, but when worldview development occurs is still a big question. The creation of a child-friendly worldview measure would allow for even more to be learned about worldview development, further addressing these how, why, and when questions.

While a majority of worldview development likely occurs during childhood, worldviews are still developing in emerging adulthood. Emerging adulthood is a time of questioning the beliefs and values of parents and greater society structures, and, for a large number of emerging adults, it is a time of great change, as individuals leave their

homes to attend college or begin work (Gutierrez & Park, 2015). To measure worldview change during emerging adulthood, Gutierrez and Park (2015) measured college freshmen's worldviews at the beginning and at the end of their first semester. While a majority of worldview assumptions stayed the same, most participants experienced a change on at least one dimension from the beginning to the end of the semester. Thus, emerging adults seem to already have a generally stable worldview that is still open to change under certain circumstances.

**Measuring worldview development and change.** Worldview is an inherently difficult construct to measure and thus to research empirically. First, we cannot study worldviews without our own worldview influencing the study and the conclusions drawn from it. Second, because worldview assumptions function in our daily lives without explicit recognition of the assumptions, using behavioral measures or qualitative data from interviews (rather than individuals self-reporting their worldview beliefs, values, and attitudes on a questionnaire) could be advantageous, though certainly more prone to researcher error. Nonetheless, developing a worldview measure that accurately represents individuals' true worldview assumptions is not impossible. Instead, the items for the measure simply need to be carefully generated and tangible enough to allow the participants to easily answer without needing to explicitly identify what their worldview assumptions are. Then, items need to be tested for reliability and validity to ensure that they are capturing individuals' worldview assumptions as they vary from person-to-person. Furthermore, worldview scales are extremely useful, as they allow research to be conducted more efficiently, at lower cost, and with less confounding variables than qualitative or behavioral research. In conclusion, worldview measures, despite their

limitations, allow more research to be done on the construct of worldviews, thus furthering the amount of knowledge we have on worldviews.

### **The Current Studies**

With the goal of creating a more comprehensive, valid, and reliable measure of worldviews, a three-step iterative process is employed. The first step includes compiling existing, validated measures of worldviews. To ensure comprehensiveness (that is, covering a wide range of worldview dimensions), measures that utilize different worldview factor structures and which are based on varying dimensions of worldviews were selected. The second step consists of collecting data on these combined measures and analyzing the data they generate to see how the items are or are not loading onto factors. The third step includes interpreting the resulting factor structure and identifying the dimensions represented by each factor and the dimensions missing. If it is determined that the final model supported by the data is missing key worldview dimensions (that is, if only one or two dimensions are represented in the final factor structure and there is thus a lack of multidimensionality), more published measures will be explored or novel items generated and added to the battery of measures for additional rounds of data collection and analysis. These steps will repeat as many times as necessary to produce a detailed yet parsimonious scale (i.e., variance explained as close to 80% as possible, with alphas at .70 or above) with strong reliability.

Studies 1 and 2, which are discussed in detail below, form one iteration of this three-step process. Study 1 compiled five existing measures of worldviews into a 160-item battery of measures. Because factor analyses necessitate a 5-10 participants-per-item ratio (Comrey & Lee, 1992), the primary aim of Study 1 was to reduce the 160 statements

to around 70 items. These 70 items would necessitate at least 700 participants in order to run half of the sample with an Exploratory Factor Analysis (EFA) and the other half with a Confirmatory Factor Analysis (CFA), a much more reasonable sample size than 1,600, which 160 items would require. The reduced item set was then used in Study 2 on a sample of participants recruited and paid through Amazon Mechanical Turk. The data collected in Study 2 was analyzed with an EFA and then a CFA to identify the factor structure of worldviews as measured through these 70 or so items. Then, the third step of the iterative process as described above took place: interpreting the resulting factor structure, and determining if the final model supported by the data is missing key worldview dimensions or otherwise requires modifications and improvements for future research.

### **Study 1**

The purpose of Study 1 was two-fold: (1) to compile existing measures of worldviews into a battery of worldview measures and (2) to run preliminary factor analyses on the data collected with the primary aim of reducing the items to a more feasible number for subsequent factor analyses with a much larger sample (Study 2).

#### **Method**

**Participants.** Participants ( $N=171$ ) were recruited from a mid-size, public university via the university's online psychology research platform. Three participants were excluded from analyses for not responding to any of the worldview or demographic questions, leaving 168 subjects used for analyses. All subjects were enrolled in a psychology class that awarded class credit or extra credit for their participation in this study. After volunteering for the study, participants received a link to take the survey

online via Qualtrics. Only students of the university had access to the research platform and could sign up for the study. Participants were between 18 – 51 years ( $M = 21.84$ ,  $SD = 5.50$ ), and 62.6% of participants identified as female, 35.1% as male, and 0.6% as another gender. Participants self-reported their ethnicity (defined as one's ethnic heritage) as European (73.2%), multiethnic (7.7%), Asian (4.2%), Native American (3.6%), Latin/Central/South American (2.4%), African (1.2%), Middle Eastern (0.6%), Pacific Islander (0.6%), and other (0.6%). 6% of participants did not report their ethnicity.

**Measures and Procedure.** In order to thoroughly explore the worldview construct and its underlying components, five published worldview measures (described in Table 2) were combined into a 160-item scale. The measures included the Scale to Assess Worldviews (SAWV; Ibrahim & Heuer, 2016), the Worldview Assessment Instrument (WAI; Koltko-Rivera, 2000), the Connection of Soul Scale (COS; Ai et al., 2014), the Conflicting Worldviews Questionnaire (CWQ; Devlin, 1995), and the Integrative Worldview Framework (IWF; Hedlund-de Witt, Boer, & Boersema, 2014). These measures were chosen for several reasons. First, they focus on multiple dimensions of worldviews, while many other worldview measures focus on a single dimension. Multidimensionality is necessary in order to study the worldview construct as a whole. Without it, identifying a comprehensive underlying factor structure of worldviews would prove impossible. If all of the measures included in this battery used the same five dimensions of worldviews, there would be no way to conclude whether dimensions beyond those five belong in a worldview measure (though, of course, the present research is still limited to the dimensions and items of the five chosen measures). The COS is the only scale included in this battery of measures which is unidimensional, exclusively

dealing with the worldview beliefs involving death (e.g. what happens to one's soul after death). Although it is unidimensional, it was included in this battery because the other four measures lack statements regarding death-related beliefs, which are a potentially fundamental aspect of worldviews. Thus, this scale is included so as to add to the comprehensiveness of this battery of measures. Second, these five measures include diverse dimensions and factors, rather than all including the same handful of dimensions or identifying the same underlying factors (see Table 2 for a list of the measures, their dimensions, and the factors identified in their analyses). Third, these measures were created using principal component analyses or factor analyses. Therefore, their dimensions are supported by both theory and data. However, as mentioned previously, these measures could be greatly improved upon given that they are based on factor structures that have subpar alpha levels (below .70; Ai et al., 2014), account for far less variability in the data than the typical standard for factor structures (80%; Roths, 2016), were found using a relatively homogenous sample of participants, and/or have validity issues. To learn how the factor models of these five measures fit the new data from Study 1, see Appendix E.

Participants were administered the combined worldview measures, comprised of 160 worldview statements, using Qualtrics, an online survey platform. Each participant received the 160 items in a randomized order in order to guard against the potential order effects of a measure of this length. In prior research, each of the original five measures had directed participants to indicate the degree to which they agreed with each statement on a Likert scale, although they varied slightly in the number of points on the Likert scale. For consistency and thoroughness, each of the 160 statements were followed by a

7-point Likert scale (already utilized in the WAI, the CWQ, and the IWF), where 1 = Strongly Agree and 7 = Strongly Disagree. Participants were allowed to skip any questions they did not wish to answer. Participants were also given the option of responding “Don’t Know” to any of the statements if they were unsure of what the statement meant. The combined items along with instructions provided to the participants can be found in Appendix A. The worldview statements were followed by a set of demographic questions (see Appendix B).

## **Results**

The data were analyzed using an EFA to observe how the statements group into factors and reduce the number of statements from the original 160. As mentioned previously, the ratio of participants to questionnaire items in this study (168:160) is far below the suggested range of 5-10 times the number of participants as items (Comrey & Lee, 1992). Indeed, the KMO measure of Sampling Adequacy was extremely low at .21. Thus, this study was utilized as a first step with the primary aim of reducing the statements from 160 to a more feasible number for subsequent factor analyses with a much larger sample in Study 2. The EFA was run using Principal Factor Analysis with Promax rotation so as to allow for correlation among the factors – something we would expect among dimensions of beliefs. Due to the length of the survey and the option of skipping statements or responding with “Don’t Know,” most participants had missing data for at least one of the statements. This combined with the already low item-to-participant ratio meant that factors could not be extracted if data were removed pairwise

or listwise. Thus, missing data needed to be replaced with the mean response for that particular statement in order for the factor model to converge.<sup>2</sup>

First, the EFA was run using the traditional Kaiser-Guttman criteria: limiting the factors to those with eigenvalues of at least 1. Upon analyzing the scree plot (Cattell, 1966) and variance explained tables, it became clear that factors beyond Factor 8 (i.e., Factors 9 through 44), explained only minute portions of the total variance (about 1.5% and less). Furthermore, the items loading onto these other factors were not as interpretable as the items loading onto Factors 1 through 8, which appeared to (at least in this preliminary step) converge on a clear dimension. More about the retained factors will be discussed later in this section. After deciding which preliminary factors to retain, ten additional iterations of the EFA were run, each time eliminating items that failed to meet predetermined criteria for retention. These criteria included: (1) communality values of at least .20 (meaning more than 20% of the variance observed in the item is explained by the factors; Yong & Pearce, 2013), (2) a rotated factor loading of at least .40 (Tabachnick & Fidell, 1996; Comrey & Lee, 1992), and (3) no significant cross-loadings in order to improve the interpretability of the separate factors. For this particular study, this meant that items were retained if they loaded onto multiple factors, but loaded onto one factor substantively more than the others (e.g. .78 on one factor and .33 on another factor). Items that loaded nearly equally onto multiple factors and also did not load strongly onto either of the factors (e.g. .41 and .44) were discarded. There were no items with nearly

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<sup>2</sup> This method is not ideal, as we would like to preserve all variability observed in the dataset to come to the most accurate conclusions about the factor structure. However, because this study is to be used as a preliminary step to reduce items and not to make final conclusions regarding the factor structure, replacing missing data with the mean is reasonable.

equal cross-loadings at .50 or above. After several iterations of the EFA, the original 160 statements were reduced to 79 items that met the aforementioned criteria.

To further consolidate the remaining statements, inter-item correlations were observed. Two items were removed that correlated with other items in the same factor at greater than .80, as this suggested that the items were treated nearly identically by the participants, and thus were repetitive – something we do not want while attempting to reduce items. Seventy-seven items were retained following the EFA: 21 items on Factor 1, 16 items on Factor 2, 16 items on Factor 3, 8 items on Factor 4, 6 items on Factor 5, 4 items on Factor 6, and 3 items each on Factors 7 and 8. The retained factors and their final 77 items explained 46.27% of the total variance observed. This is far below the ideal 80% outlined above, but it was determined that parsimony was of more importance in this preliminary study than variance explained. Indeed, in earlier iterations of the EFA used for this study, the variance explained was upwards of 70%.

Though this is only a preliminary look at the factor structure of this new, combined worldview measure, the factors do contain conceptually similar items. Factor 1 included items that describe monotheistic beliefs about the afterlife, God, and prayer; Factor 2 pertained to benevolence and optimistic beliefs; Factor 3, hard work and respect for authority; Factor 4, Eastern-based spirituality; Factor 5, the illusion of free will; Factor 6, society as the cause of social ills rather than individuals; Factor 7, individualism; and Factor 8, importance of money. See Table 3 for a list of the individual items that load onto the eight factors as well as their correspondence to Koltko-Rivera's list of worldview dimensions found in Table 1.

Small to medium correlations were identified between Factors 1 and 2 ( $r = .27$ ), 1 and 4 ( $r = .34$ ), 1 and 5 ( $r = .27$ ), 1 and 6 ( $r = -.22$ ), 2 and 3 ( $r = .23$ ), 2 and 5 ( $r = .33$ ), 3 and 5 ( $r = .29$ ), 3 and 6 ( $r = -.24$ ), 3 and 7 ( $r = .22$ ), 3 and 8 ( $r = -.22$ ), 5 and 6 ( $r = -.36$ ). So, Monotheistic Beliefs are positively correlated with Benevolence and Optimism, Eastern-Based Spirituality, and Illusion of Free Will, but negatively correlated with Society as the Root of Social Ills. Benevolence and Optimism is positively correlated with Hard Work and Respect for Authority and Illusion of Free Will. Hard Work and Respect for Authority is positively correlated with Illusion of Free Will and Individualism and negatively correlated with Society as the Root of Social Ills and Importance of Money. Lastly, Illusion of Free Will is negatively correlated with Society as the Root of Social Ills.

Table 3  
*Retained Factors and Items Following Study 1*

Factor 1: Monotheistic Beliefs		Factor Eigenvalue: 13.870
<i>Correspondence to Table 1 Dimensions</i>	<i>Items</i>	<i>Loadings</i>
World and Life group: Deity, Ontology, and Cosmos	After death there is no "afterlife."	-.883
	After death my soul goes to an absolutely peaceful place, the Heaven.	.825
	Prayer may make someone feel good, but otherwise it is pointless.	-.797
	After death I come to the community with god.	.789
	After death the life of body and soul stops.	-.752
	It is pure coincidence that human life has developed on Earth.	-.731
	What people call 'God' does not only exist above, but also here in the world around us.	.718

Table 3, cont.

*Retained Factors and Items Following Study 1*

Factor 1, cont.: Monotheistic Beliefs	
<i>Items</i>	<i>Loadings</i>
Regarding my life, after death everything is over.	-.711
After death I come to paradise.	.708
God stands far above life on Earth.	.675
Physical existence is the only existence I have.	-.674
There is no such thing as an 'ultimate' or spiritual reality beyond everyday life.	-.664
I believe every human being has spiritual or divine core.	.657
Science is the only source of trustworthy knowledge.	-.624
There is a real spiritual realm that affects our life in this world.	.624
I have sometimes had experiences that you could call spiritual.	.612
I find the whole idea of 'spirituality' or 'something spiritual' nonsense.	-.606
I take a moment for reflection, prayer or meditation regularly.	.602
When people say they feel joy through spiritual experiences, this is just the power of suggestion.	-.579
We can receive messages from spirits.	.570
The suffering that happens to people does not have any meaning.	-.400

Table 3, cont.

*Retained Factors and Items Following Study 1*

Factor 2: Benevolence and Optimism		Factor Eigenvalue: 7.524
<i>Correspondence to Table 1 Dimensions</i>	<i>Items</i>	<i>Loadings</i>
Human Nature group: Moral Orientation, Mutability	Inner growth is really important to me.	.724
	The Earth's resources are strictly limited so we should be careful how we use them.	.669
Behavior group: Activity Direction, Activity Satisfaction	We should all try to take care of each other.	.600
	I believe it is more important to be a good person rather than a successful person.	.589
Interpersonal group: Connection, Interaction	Basically, all human beings have a great potential for good.	.589
	I see life as one big growth-process.	.578
World and Life group: Humanity-Nature, Purpose of Life	Nature should be protected from being damaged by human activity.	.550
	We are healthier when we live in harmony with our natural world.	.549
	We should encourage small, supportive groups in society.	.548
	It may take a lot of effort, but a person can decide to change even a very old habit.	.537
	People should consider other people's feelings.	.526
	Everybody needs to take care of oneself and stand up for oneself.	.482
	I want to contribute to society in my own, unique way.	.468
	Every person has the potential to do good.	.453
	I believe that feelings and human relationships are the most important things in life.	.449

Table 3, cont.

*Retained Factors and Items Following Study 1*

Factor 2, cont.: Benevolence and Optimism		
	<i>Items</i>	<i>Loadings</i>
	It is important that people be involved in the present rather than concerned with the past or the future.	.417
Factor 3: Hard Work and Respect for Authority		Factor Eigenvalue: 4.670
<i>Correspondence to Table 1 Dimensions</i>	<i>Items</i>	<i>Loadings</i>
Will group: Agency, Intrapsychic	If people really want to succeed, they'll overcome any kind of discrimination.	.676
Behavior group: Activity Satisfaction, Control Location	If you work hard and manage your money well, you'll never have to worry about being poor.	.666
	No other group of people can keep you down if you are determined to succeed.	.604
	People should NOT let their emotions get in the way of making important decisions.	.564
	Anyone who really wants to work can get a job.	.555
	Top management should make all the decisions: everyone in the company should follow these directives.	.527
	Social welfare programs just prevent people from working toward taking care of themselves.	.519
	The important decisions in a family should be made by the parents alone, rather than deciding along with the children.	.514
	A teacher should set rules in class rather than decide them along with the students.	.512
	When poor people do drugs, it's because they don't want to improve themselves.	.507

Table 3, cont.

*Retained Factors and Items Following Study 1*

Factor 3, cont.: Hard Work and Respect for Authority		
	<i>Items</i>	<i>Loadings</i>
	It is important for twelve-year-old children to obey their parents' directions without dispute.	.504
	A shift in company policies can make even a hard-working person unemployed and poor.	-.464
	Anyone who really values education will be sure to graduate from high school, at least.	.444
	Unemployment exists because some people don't want to work.	.440
	People should be required to move to wherever they can get a job.	.431
	Human innovation is more powerful than the natural world.	.421
Factor 4: Eastern-Based Spirituality		Factor Eigenvalue: 4.213
<i>Correspondence to Table 1 Dimensions</i>	<i>Items</i>	<i>Loadings</i>
Cognition group: Knowledge, Consciousness	After death my substance unifies with the universe or the big whole.	.803
World and Life group: Ontology	After death my soul connects with the world spirit or the infinite force.	.726
	After death I am unified with the collective consciousness.	.686
	I believe in reincarnation, that is to say, that we will be born again in this world after our death.	.587
	Some people possess actual spiritual powers like healing and being able to foresee the future.	.569
	Nothing is really 'dead': spirit infuses everything and everyone.	.545

Table 3, cont.

*Retained Factors and Items Following Study 1*

Factor 4, cont.: Eastern-Based Spirituality		
	<i>Items</i>	<i>Loadings</i>
	When overcoming my ego, I reach enlightenment (Nirvana) and peace.	.511
	I see the Earth and humanity as part of an ensouled or spiritual reality.	.487
Factor 5: Illusion of Free Will		Factor Eigenvalue: 2.388
<i>Correspondence to Table 1 Dimensions</i>	<i>Items</i>	<i>Loadings</i>
Will group: Agency, Determining Factors, Intrapsychic	The idea of "free will" is a joke: there is no such thing.	.766
	The feeling that we have personal choice is actually just an illusion.	.699
	People only believe in "free will" because they are taught to believe in it.	.632
	People really have "free will" in making choices for their lives.	-.590
	Free will is part of human nature.	-.536
	Human beings are like computers: controlled by their programming, and without real choice.	.455
Factor 6: Society as the Root of Social Ills		Factor Eigenvalue: 1.666
<i>Correspondence to Table 1 Dimensions</i>	<i>Items</i>	<i>Loadings</i>
Behavior Group: Activity Satisfaction, Control Location, Control Disposition	Poor people can justly blame rich people for their position in life.	.704
	Poor people can justly blame society for their position in life.	.678
Interpersonal group: Interpersonal Justice, Sociopolitical Justice		

Table 3, cont.

*Retained Factors and Items Following Study 1*

<b>Factor 6, cont.: Society as the Root of Social Ills</b>		
<b><i>Correspondence to Table 1 Dimensions</i></b>	<b><i>Items</i></b>	<b><i>Loadings</i></b>
World and Life group: Purpose of Life	When poor people do drugs, it is because society has made them desperate.	.642
	The fact that I am in existence is enough for me, I do not necessarily also have to have major accomplishments in life.	.455
Factor 7: Individualism		Factor Eigenvalue: 1.447
<b><i>Correspondence to Table 1 Dimensions</i></b>	<b><i>Items</i></b>	<b><i>Loadings</i></b>
Interpersonal group: Relation to Group, Relation to Humanity	Individuals should take care of themselves first.	.769
	My first allegiance is to myself, rather than to anyone or anything else.	.688
	My own goals are more important than the goals of my group, at work, school, or in my community.	.486
Factor 8: Importance of Money		Factor Eigenvalue: 1.336
<b><i>Correspondence to Table 1 Dimensions</i></b>	<b><i>Items</i></b>	<b><i>Loadings</i></b>
Behavior group: Activity Direction World and Life group: Purpose of Life	I aspire a luxurious and comfortable lifestyle.	.796
	Earning a lot of money is really important to me.	.665
	The more money I can spend, the higher the quality of my life.	.444

*Note.* Items were retained for having communalities above .20, factor loadings of at least .40, no equal cross-loadings, and inter-item correlations below .80. Factors were named based on the themes present in their retained items.

## Study 2

The purpose of Study 2 was to reidentify and confirm the factors of this new, comprehensive worldview measure with an adequate sample size so as to ensure that the new measure maintained a meaningful breath of worldview assumptions while eliminating any further redundancies or extraneous items. This second study analyzed the retained 77 items using a sample size that was large enough (782 participants) to divide between two analyses: EFA and CFA. Recall that factor analyses necessitate a 5-10 participants-per-item ratio (Comrey & Lee, 1992). Thus, with 77 items, a sample size of 770 was required to conduct two factor analyses with 385 participants for the EFA and 385 for the CFA. As in Study 1, factors and items were removed during the EFA using predetermined criteria, including as eigenvalues less than 1 and factor loadings less than .40. The final EFA factor structure and items were then subjected to a CFA. The fit of the factor model as well as the comprehensibility of the items are evaluated and discussed.

### Method

**Participants.** The 77 items retained following the analyses in Study 1 were administered to a new sample ( $N = 1,099$ ), recruited via Amazon Mechanical Turk (MTurk). MTurk is an online platform where individuals (called “workers”) complete tasks for pay. MTurk has been successfully utilized in much research and provides easy access to a large number of participants who are more diverse than the participant pools that universities have to offer (Paolacci, Chandler, & Ipeirotis, 2010). MTurk is also particularly valid for obtaining representative samples for studies on beliefs, such as political beliefs (Clifford, Jewell, & Waggoner, 2015; Conway, Repke, & Houck, 2017). Finally, MTurk results are typically similar to results from other samples (Houck,

Conway, & Repke, 2014). Still, there are caveats inherent to using online platforms such as these for collecting data. For example, participants are not completing the survey under researcher supervision (though recall that this was also true of Study 1). Therefore, participants can be paying as much or as little attention to the questions as they like. To mitigate this issue, a quality control question was placed in the survey, which will be discussed in detail below. Furthermore, subjects were paid for their participation, which might adversely affect the representativeness of the sample. Still, using MTurk provides a more diverse subject pool than what is normally obtained in university settings (Paolacci & Chandler, 2014). Workers were paid \$.50 for completing the present study, which took an average of 17.70 minutes to complete.

Although there are MTurk workers around the world, only workers in the United States (that is, workers with a US IP address) and whose user language was English were able to view and participate in this study. Of the 1,099 participants, 327 participants were excluded due to failure to correctly respond ( $n = 221$ ) or respond at all ( $n = 106$ ) to a quality control question described below, leaving 772 participants used for analyses. The 772 retained participants ranged between 18 and 76 years old ( $M = 37.31$ ,  $SD = 12.27$ ). Just over half (51.9%) of participants identified as female, 46.1% as male, and 0.5% as another gender. All of the individuals who selected “another gender” self-reported as non-binary. Participants self-reported their ethnicity as European (64.4%), African (8.2%), Asian (7.1%), Native American (5.8%), Latin/Central/South American (5.3%), multiethnic (5.1%), Middle Eastern (0.6%), Caribbean (0.5%), Pacific Islander (0.4%), East Indian (0.1%), and another ethnicity (1.2%). One and a third percent of participants did not report their ethnicity. Following the completion of data collection, participants

were randomly sorted into two equal groups of 386 participants, with one group of participants used for the EFA and the other group used in the CFA.

### **Measure and Procedure**

The 77 worldview statements listed in Table 3 were administered in random order to the MTurk participants via Qualtrics online survey platform. Participants responded using a six-point Likert scale (1 = Strongly Agree, 6 = Strongly Disagree). A six-point scale was selected in place of the seven-point scale used in Study 1 in order to eliminate a mid-point (“Neither Agree or Disagree”) option and thus force participants to choose one side of the agree-disagree scale. Participants were allowed to skip any question if they did not wish to or could not answer. Prior research has shown that adding a neutral midpoint on a Likert scale inflates the number of neutral responses beyond the number of neutral positions actually held by respondents. For example, when the neutral option is moved from outside of the Likert options to the middle of the Likert options, the number of participants choosing the neutral option doubled (Willits & Janota, 1996). Some have also argued that the inclusion of a midpoint encourages social desirability responses in participants. By including the midpoint, participants have an easy way to avoid making a socially undesirable response (Garland, 1991). Furthermore, because worldview assumptions are so pervasive in our lives and in our psyches, individuals likely have an opinion on these items, one way or another. In addition, the “I Don’t Know” option was removed in order to encourage participants to answer and thus reduce the amount of missing data so that the data could be analyzed while excluding cases pairwise instead of replacing missing cases with the mean. Again, participants were allowed to skip any questions they preferred not to answer. Furthermore, a quality control question was

included so as to minimize the amount of bad data included in the analyses. The question read, “To ensure that you are properly reading each question, please choose Strongly disagree for this item.” All participants who failed the check question by not responding “Strongly Disagree” (whether they skipped the question or answered incorrectly) were excluded from analyses ( $n = 327$ ).

Following the randomized worldview statements and quality control question, participants were administered a set of demographic questions. These questions differed slightly from those used in Study 1 in that Study 2 participants were not asked about their parents, and were asked to report their yearly household income instead of their immediate families’ household income. These changes were made in order to reduce the length of the survey and to reflect the higher mean age of the MTurk sample. See Appendix C for the demographic questions used in Study 2.

## **Results**

The data were analyzed using EFA and CFA, with half of the data used for the EFA and the other half for the CFA. First, a series of EFAs were conducted in order to identify the worldview factor structure with the required sample size for this analysis. Recall that the Study 1 EFA was conducted in order to reduce the number of items and provided only a rudimentary idea of the factor structure of the five combined measures. The sample size in Study 1 was not large enough (as demonstrated by the very low KMO Measure of Sampling Adequacy) to draw firm conclusions on the factor structure. Then, the final factor structure identified by the EFA was subjected to CFA on the other half of the dataset.

**Exploratory Factor Analysis.** As in Study 1, the EFA was run with Principal Axis Factoring and Promax rotation. Missing data were less of an issue with this sample as it was in the first study (perhaps due to the removal of the “I Don’t Know” option), so missing cases were excluded pairwise instead of replaced with the mean. The first EFA round used the Kaiser criterion, which extracts all the factors with eigenvalues above one, resulting in thirteen extracted factors. Factors beyond nine (factors ten through thirteen) were not easily interpretable because they had no items or only one item that loaded at .40 or higher. So, nine factors were extracted in the second round of EFA. Then, similar to Study 1, factors and items were evaluated for their eigenvalues, communalities, factor loadings, inter-item correlations, and cross-loadings. Factors were removed when their eigenvalues dropped below one, and items were removed if their communalities were below .40 (a stricter criterion than that used in Study 1 to make a more robust measure; Costello & Osborne, 2005), if they failed to load at .40 or higher on any factors, if they correlated with other items at .70 or higher (again, a stricter criterion), or if they cross-loaded on more than one factor. Because removing any item or factor impacts all other items and factors in a factor analysis, criteria were evaluated in isolation from one another, and only a single item or factor was removed from one iteration of the EFA to the next. This ensured that factors and items were not needlessly removed and that the five criteria were followed in order through the whole series of EFAs. Factors were removed as soon as their eigenvalues dropped below 1, even if there were items with no loadings of .40 or higher. Once all the factors passed the Kaiser criterion, items were evaluated for their factor loadings, then correlations with one another, and finally, cross-loadings. Using this method, 38 additional rounds of EFA were conducted, each

removing a single item or factor at a time and re-evaluating the criterion until they were all satisfied.

Five factors and 41 items were retained following the 41 EFA iterations. This factor solution passed both KMO's Measure of Sampling Adequacy (.91) and Bartlett's Test of Sphericity ( $\chi^2(820) = 8916.88, p \approx 0.00$ ). The final factor structure explained 52.10% of the total variance. Though this is low by most standards, which recommend 60-80% variance explained, but adequate by some that recommend 50% variance explained. Furthermore, Principal Axis Factoring automatically produces a lower variance explained than other extraction methods, such as Principal Components Analysis. See Table 4 for the detailed final factor structure, including the factor names and the items included in each factor. The factors from the first study replicated quite well in this study even though the first study was underpowered and had so much missing data. Only the last three factors in Table 3, Society as the Root of Social Ills, Individualism, and Importance of Money, which contributed the least to the factor model, failed to appear in the final factor structure in Study 2, though they did surface in earlier iterations of the EFA. To measure the internal reliability of the final 41 items, Cronbach's alpha was performed using all 772 participants who passed the quality control question. Cronbach's alpha was found to be .92 for Factor 1, .88 for Factor 2, .91 for Factor 3, .87 for Factor 4, and .82 for Factor 5, all well above the .70 threshold for an adequate alpha (Ai et al., 2014). This range of alphas was also higher than the range of Cronbach's alphas for the four out of five original measures that I found using data from Study 1 (WAI:  $\alpha = .62-.85$ , CWQ:  $\alpha = .76-.80$ , IWF:  $\alpha = .50-.78$ , and SAWV:  $\alpha = .26-.70$ ). The COS alphas calculated from Study 1 data were strong ( $\alpha = .84-.93$ ). Furthermore, all 41

retained items fell within the acceptable bounds of skewness and kurtosis (-2 and 2; Trochim & Donnelly, 2006; Field, 2000 & 2009; Gravetter & Wallnau, 2014).

Moderate correlations were identified between Factors 1 and 3 ( $r = .320$ ), 1 and 5 ( $r = -.395$ ), 3 and 2 ( $r = -.416$ ), and 3 and 4 ( $r = .426$ ). Thus, Benevolence and Optimism is positively correlated with Eastern-Based Spirituality and negatively correlated with Illusion of Free Will, whereas Eastern-Based Spirituality is positively correlated with Hard Work and negatively correlated with Secularism.

Table 4  
*Retained Factors and Items Following Study 2*

Factor 1: Benevolence and Optimism		Factor Eigenvalue: 9.565
<i>Items</i>		<i>Loadings</i>
We should all try to take care of each other.		.913
People should consider other people's feelings.		.876
Every person has the potential to do good.		.733
We should encourage small, supportive groups in society.		.669
I believe it is more important to be a good person rather than a successful person.		.667
Nature should be protected from being damaged by human activity.		.647
Basically, all human beings have a great potential for good.		.640
Inner growth is really important to me.		.617
We are healthier when we live in harmony with our natural world.		.578
I want to contribute to society in my own, unique way.		.561
I see life as one big growth-process.		.557

Table 4, cont.

*Retained Factors and Items Following Study 2*

Factor 2: Secularism		Factor Eigenvalue: 6.111
<i>Items</i>		<i>Loadings</i>
Science is the only source of trustworthy knowledge.		.875
Prayer may make someone feel good, but otherwise it is pointless.		.844
It is pure coincidence that human life has developed on Earth.		.760
Regarding my life, after death everything is over.		.742
I find the whole idea of 'spirituality' or 'something spiritual' nonsense.		.705
When people say they feel joy through spiritual experiences, this is just the power of suggestion.		.681
After death, my soul goes to an absolutely peaceful place, the Heaven.		-.525
I take a moment for prayer or meditation regularly.		-.475
What people call 'God' does not only exist above, but also here in the world around us.		-.417
Factor 3: Eastern-Based Spirituality		Factor Eigenvalue: 4.324
<i>Items</i>		<i>Loadings</i>
After death my substance unifies with the universe or the big whole.		.864
After death my soul connects with the world spirit or the infinite force.		.838
I believe in reincarnation, that is to say, that we will be born again in this world after our death.		.765
When overcoming my ego, I reach enlightenment (Nirvana) and peace.		.704
Nothing is really 'dead'; spirit infuses everything and everyone.		.688
I see the Earth and humanity as part of an ensouled or spiritual reality.		.684
We can receive messages from spirits.		.661
Some people possess actual spiritual powers like healing and being able to foresee the future.		.533

Table 4, cont.

*Retained Factors and Items Following Study 2*

Factor 4: Hard Work		Factor Eigenvalue: 3.081
<i>Items</i>		<i>Loadings</i>
Anyone who really wants to work can get a job.		.773
If people really want to succeed, they'll overcome any kind of discrimination.		.726
Social welfare programs just prevent people from working toward taking care of themselves.		.718
If you work hard and manage your money well, you'll never have to worry about being poor.		.701
When poor people do drugs, it's because they don't want to improve themselves.		.683
Unemployment exists because some people don't want to work.		.653
No other group of people can keep you down if you are determined to succeed.		.606
Factor 5: Illusion of Free Will		Factor Eigenvalue: 1.672
<i>Items</i>		<i>Loadings</i>
The feeling that we have personal choice is actually just an illusion.		.812
The idea of "free will" is a joke: there is no such thing.		.793
People only believe in "free will" because they are taught to believe in it.		.632
Human beings are like computers: controlled by their programming, and without real choice.		.610
Free will with a part of human nature		-.508
People really have "free will" in making choices for their lives.		-.500

*Note.* Items were retained for having communalities and factor loadings of at least .40, no equal cross-loadings, and inter-item correlations below .70. Factors were named based on the themes present in their retained items.

**Confirmatory Factor Analysis.** Exploratory Factor Analyses are often met with skepticism due to their exploratory nature and the abundance of judgement calls that must be made by the researcher (Roths, 2016; Hurley et al., 1997). It is very easy for a researcher to conclude that they have “found” a factor solution when they really have done no such thing. EFA partitions covariances into latent variables, but this certainly does not mean that these latent variables have any practical meaning on their own. Furthermore, an EFA run on one sample could result in a factor structure quite different from that of another sample, even if the samples received the same measures (Yong & Pearce, 2013). Therefore, it is paramount that the factor structure identified following EFA be substantiated with additional EFAs run on separate samples or with a CFA run on a separate sample (Costello & Osborne, 2005). A CFA takes the factor structure and, with a new set of data, subjects the factor structure to rigorous tests of fit. The CFA method is more a stringent method of substantiating factor structures because of the high standards of CFA fit indices.

The CFA for the current study was ran using the Lavaan package for R (Rosseel, 2012). Items were standardized and analyzed as ordinal data, just as they were for the EFA (Cliff, 1996; Jamieson, 2004). The maximum likelihood estimation with full information maximum likelihood (FIML) method was used for missing data, and the “DWLS” (or “expected”) values were those used in interpretation (Li, 2016). The Comparative Fit Index (CFI) and the Tucker-Lewis Index (TLI) were both found to be .95, indicating a good fit of the model (Schreiber et al., 2006). However, both the Root Mean Square Error of Approximation (RMSEA) and the Standardized Root Mean Square Residual (SRMR) were found to be .11 (90% Confidence Interval = .109, .115,  $p < .001$ ),

above the suggested maximum .10 value (Browne & Cudeck, 1992; MacCallum, Browne, & Sugawara, 1996, as cited by Lai & Green, 2016). Thus, this model has a good relative fit (i.e., it does much better than a hypothesized null model, as indicated by the CFI and TLI), but does not appear to have an adequate absolute fit (i.e., the model reproduces the data with some amount of error, as indicated by the RMSEA and SRMR). Because the two sets of fit indices measure fit from different perspectives, it is not surprising that they disagree with one another. It does, however, make it difficult to conclude whether or not the model can be qualitatively categorized as a “good” fit or a “poor” fit. Instead, the fit must be examined quantitatively – that is, on a continuous scale from better to worse model-data fit (Lai & Green, 2016). On this continuous scale, the current model would be on the better end of model-data fit but not at the top of the scale. The chi-square model fit statistic is unreliable for sample sizes as large as this one, as very small differences between the data and the model are found to be a significant model misfit (Yuan, Jiang, & Yang, 2018). So, unsurprisingly, the chi-square test of model misfit was found to be significant, with  $\chi^2(769) = 4484.06, p < .001$ .

To see if the five factors were all part of a single, higher-order factor (that is, the worldview construct), a hierarchical CFA was conducted. The five factors with their particular items were entered into the model in the same way as the initial CFA, and an additional factor (the worldview factor) was created with its “items” being the five factors themselves. This hierarchical factor model demonstrated a similar, albeit slightly weaker fit to the data as the original factor model, as one would expect when testing a model with more fixed parameters. CFI and TLI were both .93, suggesting an acceptable fit of the data to the model (Lai & Green, 2016). The RMSEA was .14 (90% Confidence

Interval = .13, .14,  $p < .001$ ) and SRMR .13, both again above the suggested .10 maximum at, indicating a misfit between the data and the model (Lai & Green, 2016). The chi-square statistic similarly suggested a significant misfit between the data and the model ( $\chi^2(774) = 6397.96, p < .001$ ), but recall that this statistic is unreliable with sample sizes this large. The adequacy of this model (when evaluated on a continuous fit scale as opposed to a categorical fit judgement) suggests that the five factors are, indeed, all part of a single, higher order factor (worldview) as opposed to being entirely separate constructs.

### **Discussion**

The goal of the present research project was to work toward a more comprehensive measure of worldviews. This goal was accomplished by compiling several published worldview measures, reducing the combined 160 items to 77 items, administering the 77 items to a large sample, identifying the factor structure with EFA, and confirming the new factor structure of the Comprehensive Worldview Measure with CFA. By combining several published measures of worldview, I was able to take advantage of each measure's theoretical and statistical strengths. Furthermore, this combination of measures provided more variability in items and dimensions than the individual measures on their own, allowing me to reconcile the different factor structures found in the original measures with each other. The EFAs and CFAs were used to distill the five published measures into the new Comprehensive Worldview Measure (CWM) by identifying the underlying factor structure of these measures and evaluating how the items fit or fail to fit with the factor structure. The factors identified and confirmed through EFA and CFA were found statistically, but they also make theoretical sense,

covering many of the worldview dimensions outlined in Koltko-Rivera's (2004) list (see Tables 1 and 3).

In general, psychological measures have great utility in psychology research and are responsible for numerous advances in the field. However, previously published worldview measures have various shortcomings, including subpar alpha levels and percent of variance explained, a lack of reliability or validity tests, and a limited convenience sample. They also vary widely in the worldview dimensions they focus on, which makes them difficult to compare with one another and difficult to ascertain if the measure is accurately capturing the worldview construct or just the worldview dimensions of particular interest to the authors. The measure resulting from these analyses, the CWM, addresses many of the issues present in prior measures of worldview. First, it does not pick and choose worldview dimensions to focus on at random or based on researcher preference, but utilizes the varied dimensions of several different worldview measures. Furthermore, the CWM has higher internal reliability ( $\alpha = .82$ ) than other worldview measures had reported in their initial research, such as the SAWV and WAI, and is higher than all of the internal reliability scores that I recalculated for each of the original five measures. However, in its current state, the CWM does not meet the conventional RMSEA model fit standard nor the 80% variance explained goal. The CWM also has not undergone additional tests of reliability or validity, including investigation into the cross-cultural applicability of this measure. These tasks are outside the scope of the current project, but are important to complete in future studies before utilizing the new measure in research.

Following evaluation of the reliability and validity of the CWM, this new worldview measure may be employed to further research on the relationship between worldviews, mental health, and individual and group behavior. In addition, still-lingering worldview questions can also begin to be answered, such as when and how worldviews develop and how useful worldview is as a single psychological construct. However, while this new measure demonstrates both theoretical and statistical strength, there are still several areas of improvement and limitations of this research project.

### **Limitations**

The CWM demonstrates many characteristics of a strong worldview measure, including a very respectable internal reliability score and a good CFI fit statistic. Still, this is a measure that would greatly benefit from various improvements, such as improving the CFA RMSEA value and the total percent of variance explained, before being widely administered in future research. Furthermore, there are certain limitations inherent to both this measure and to worldview measures in general that cannot be improved with future adjustments. First, while the current research investigated more varied worldview dimensions by combining five different worldview measures, the dimensions and items analyzed were still limited to those of the original five measures. Thus, some worldview dimensions and potential factors were inevitably left out of the original 160 items and are thus left out of the final 41 items as well, such as beliefs about sexuality and the origins of knowledge. Second, while worldview is an enormous construct, there are several practical limitations that constrain psychological measures and thus limit how much of the construct we are able to measure with a single scale. The more complex a factor structure is, the longer and more cumbersome the associated

measure is, which reduces its utility in future research. In addition, a more complex factor structure requires an extremely large sample size, which is difficult to recruit and difficult to manage. Even the best worldview measure would need to balance comprehensiveness with parsimony and model fit.

Furthermore, it could be the case that the true factor structure that underlies worldviews cannot be identified with these or any other published worldview measures. As mentioned previously, worldviews are so deeply engrained in our personhood that they function, at least in large part, outside of our everyday awareness. This characteristic of worldviews is what necessitates the use of factor analyses to uncover the latent dimensions which worldviews are comprised of. However, this also means that we need to identify the correct manifest beliefs, values, and attitudes which worldviews underlie. Otherwise, the results of the factor analyses on these manifest variables will not capture the worldview construct in totality or perhaps even at all. This is a fundamental dilemma of all hard-to-observe psychological constructs, including depression, intelligence, and personality. Only with adequate theoretical and practical evidence can we hope to surmount this issue and posit a strong dimensional model of worldviews.

### **Future Directions**

Minor tweaks to the factor structure of the CWM, including dropping a few items or expanding the sample size, could improve the CFA model fit so that it meets conventional standards for a good fitting model. In the present study, haphazardly removing items post hoc and re-running the CFA until the fit indices improved would have posed a serious Type 1 error issue by increasing the chance that the model fits this particular sample very well but not the population in general (Weston & Gore, 2006).

However, future studies could identify theoretical justification for making edits to the factor structure with the aim of improving the model fit. For example, perhaps adding an additional factor that represents one of the missing worldview dimensions from Table 1 would greatly improve the model fit. On the other hand, the model may fit the data better if there were fewer than five factors. Future analyses based on a priori changes to the factor structure will be able to if this factor structure or an alternate yields the best model fit.

Imbedded within the current research project are measures and procedures that begin to confirm the reliability and validity of the CWM. Content validity was managed by compiling several previously published worldview measures, thus capitalizing on many expert opinions of what worldview is and what items a worldview scale ought to contain. Construct validity was acquired through the EFAs and CFAs, which aided in identifying the structure of the worldview construct (Goodwin, 1999). Finally, the internal consistency of the CWM (as measured by Cronbach's alpha) was found to be very strong ( $\alpha = .82$ ; Nunnally & Bernstein, 1994). Still, the CWM ought to undergo tests of its criterion validity as well its test-retest reliability before conclusions can be made about the measure's reliability and validity (Elmore, 2010). Testing the test-retest reliability of the CWM will be quite straightforward. The CWM will be administered to a sample and then re-administered at a later time (not so long after that we would expect the worldviews to have developed and changed) to the same sample. A strong correlation between the individual's responses at the two different times would indicate strong test-retest reliability (Elmore, 2010). Criterion validity will be more difficult to assess. Individuals will complete the CWM and one or more separate measures that we would

predict to correlate with the CWM. The higher the correlation between the measures, the higher the criterion validity (Elmore, 2010). Some examples of measures that should correlate with the CWM are the World Values Survey (Inglehart, 1997), the Social Axiom Survey (Leung et al., 2002), or a behavioral measure that relates to worldviews as measured by the CWM. For example, we would expect those who score low on the secularism factor in the CWM to attend religious events more often and be more involved in religious communities than those who are high on secularism.

Once reliability and validity tests demonstrate that the Comprehensive Worldview Measure is ready for use, there are a multitude of potential uses and exciting future directions for the CWM. For example, the measure could be administered to a sample and then factor scores could be calculated from their data. A factor score is a standardized score on each factor for each participant. For example, one participant could have a factor score of -.53 on Benevolence and Optimism, 1.71 on Secularism, -.94 on Eastern-Based Spirituality, 2.4 on Hard Work, and .23 on Illusion of Free Will. Not only do these factor scores provide insight into the worldview of this individual, they can also be used to conduct further research on worldviews. For example, factor scores could be used in a multiple regression to analyze the relationship between different worldviews and cognitive, emotional, or behavioral outcomes.

Furthermore, the CWM can also be used to create the first child-friendly measure of worldview. The 41 items could be directly translated into child-friendly questions, or, perhaps more practically, the 41 items and five factors could be used as a guide for creating a smaller number of child-friendly questions that preserves the same five-factor structure. The new child-friendly questions could be first administered to adults and

analyzed with CFA to ensure they are reproducing the same five factors. Then, the items would be administered to children and subject to another CFA. The resulting child-friendly worldview scale could be monumental in researching the development of worldview, as it would actually allow researchers to directly measure children's worldviews on a standardized scale, as opposed to measuring them through their parents, behavioral observation, or interviews.

Another exciting future direction for the CWM would be its use in cross-cultural research. First, data would need to be collected on cross-cultural samples using the CWM to see how the measure performs on other populations. To circumvent the need to translate the items, English-speaking populations could be targeted first, such as the large English-speaking Indian population. Ideally, a CFA would yield a similar fit of the CWM to the cross-cultural data as the CWM to the data in Study 2. Then, the measure could be used as it is to conduct cross-cultural worldview research. Direct comparisons could be made between the worldviews of individuals from differing cultures, and we could explore the differing role that worldview plays in mental health and individual and social behavior around the globe. However, it is more likely that different CWM versions would need to be created to maximize cross-cultural validity. Either the initial 160 items (or the 77 items retained after Study 1) would be translated and administered to a cross-cultural sample, or new measures of worldviews developed outside of the U.S. would be added to the battery of measures for new rounds of EFA and CFA.

The Comprehensive Worldview Measure, though not yet perfected, is a necessary first step in creating a widely-applicable measure of worldview that resolves discrepancies between several already-published measures of worldview. Worldview is a

hugely understudied construct with immense potential in the field of psychology. However, very little advancement can be done in worldview research without a theoretically and statistically strong scale such as the Comprehensive Worldview Measure.

**Appendix A: Combined Worldview Items for Study 1 and 2, Listed by Original Measure**

Items in bold were retained following Study 1. Items in italics were retained following Study 2.

**Scale to Assess Worldviews (SAWV; Ibrahim & Heuer, 2016)**

No weakness or difficulty can hold us back if we have enough will power.

Human nature being what it is there will always be war and conflict.

Women who want to remove the word obey from the marriage service do not understand what it means to be a wife.

The past is no more, the future may never be, the present is all we can be certain of.

Beneath the polite and smiling surface of human nature is a bottomless pit of evil.

I believe life is easier in the cities where one has access to all modern amenities.

When you come right down to it, it is human nature never to do anything without an eye to one's own profit.

The reason you should not criticize others is that they will turn around and criticize you.

The forces of nature are powerful enough to destroy everything that people can build.

If I spend 14 years pursuing my education, I will have a good job in the future.

***Basically, all human beings have a great potential for good.***

The relationship between people and nature is one of mutual coexistence.

**It is important that people be involved in the present rather than concerned with the past or the future.**

**The fact that I am in existence is enough for me, I do not necessarily also have to have major accomplishments in life.**

Although people are intrinsically good, they have developed institutions which force them to act in opposition to their basic manner.

I plan for tomorrow, today is of no consequence, and the past is over with.

I prefer to relax and enjoy life as it comes.

The father is the head of the household; every person in the family should follow the head.

*We are healthier when we live in harmony with our natural world.*

We can find happiness within ourselves.

*Every person has the potential to do good.*

When natural catastrophes occur, we have to accept them.

Planning for the future allows one to accomplish all of one's goals.

**I believe that feelings and human relationships are the most important things in life.**

Some people will help you and others will try to hurt you.

**Top management should make all the decisions: everyone in the company should follow these directives.**

I feel quite powerless when faced with the forces of nature.

We need to model our lives after our parents and ancestors and focus on our glorious past.

*I believe it is more important to be a good person rather than a successful person.*

**Nowadays, a person has to live pretty much for today and let tomorrow take care of itself.**

**Conflicting Worldviews Questionnaire (CWO; Devlin, 1995)**

People should only worry about their close friends and families.

*We should encourage small, supportive groups in society.*

*Nature should be protected from being damaged by human activity.*

Nature should be controlled so it doesn't overpower humans.

*We should all try to take care of each other.*

If we give it a chance, nature can repair itself.

We should NOT worry about running out of natural resources—we just have to look in other places for them.

Like a mother bear and her cubs, nature should be left alone.

**Individuals should take care of themselves first.**

**People should NOT let their emotions get in the way of making important decisions.**

People try to control other people too much in our society.

People should have more drive and ambition.

Natural disasters are good examples of how much more powerful nature is than humans.

Nature always bounces back and always will.

People are, for the most part, capable.

Economic competition should be encouraged.

*People should consider other people's feelings.*

As long as we are careful, nature will meet our needs.

*Social welfare programs just prevent people from working toward taking care of themselves.*

**Human innovation is more powerful than the natural world.**

We should interact with nature with great caution and care so as not to damage it.

Societies in which people cooperate are good societies.

Decision-makers have too much power.

Assertive people are usually aggressive.

People should NOT be made to work under pressure.

We must find a way to control nature or else it will destroy us.

People are generally helpful.

Ecosystems are delicately balanced and cannot tolerate much human interference.

We should leave the really important decisions to experts.

Material wealth is the best measure of social progress.

**People should be required to move to wherever they can get a job.**

We should ALL be involved in political decision-making.

We should take risks with the natural environment (such as trying new technologies) if

we want to ensure plenty of resources.

**The earth's resources are strictly limited so we should be careful how we use them.**

**Worldview Assessment Instrument (WAI; Koltko-Rivera, 2000)**

Some social groups can keep people down no matter how much the people want to succeed.

My country's needs come before my own.

**There is a real spiritual realm that affects our life in this world.**

*If you work hard and manage your money well, you'll never have to worry about being poor.*

*Free will is part of human nature.*

My neighborhood's needs come before my own.

**A teacher should set rules in class rather than decide them along with the students.**

Prejudice keeps many people from getting a job.

*The feeling that we have personal choice is actually just an illusion.*

Other people must take care of themselves; I've got to look out for Number One.

A person's character cannot be altered, tampered with, or changed.

When we die, we die; there is no continued existence.

*People only believe in "free will" because they are taught to believe in it.*

**My own goals are more important than the goals of my group, at work, school, or in my community.**

At home, important decisions should be made by the parents and children together.

There is only matter; there is no substance such as 'spirit.'

*If people really want to succeed, they'll overcome any kind of discrimination.*

My family's needs come before my own.

Even a lot of bad friends cannot change a basically good child for long.

*Nothing is really 'dead': spirit infuses everything and everyone.*

**Poor people can justly blame society for their position in life.**

*People really have “free will” in making choices for their lives.*

At work, managers and workers should work together to make important business decisions.

People can actually receive revelation or visions from the spiritual realm.

**When poor people do drugs, it is because society has made them desperate.**

In a company, it is better to contribute to the overall performance of one’s department rather than to just further one’s career.

**Poor people can justly blame rich people for their position in life.**

*Prayer may make someone feel good, but otherwise it is pointless.*

*Unemployment exists because some people don’t want to work.*

**It may take a lot of effort, but a person can decide to change even a very old habit.**

What I think I should do is more important to me than what the leaders of my spiritual community think I should do.

Even ‘brainwashing’ or torture cannot really change someone’s character.

*When poor people do drugs, it’s because they don’t want to improve themselves.*

*Human beings are like computers: controlled by their programming, and without real choice.*

**My first allegiance is to myself, rather than to anyone or anything else.**

**It is important for twelve-year-old children to obey their parents’ directions without dispute.**

**There is no such thing as an ‘ultimate’ or spiritual reality beyond everyday life.**

*The idea of “free will” is a joke: there is no such thing.*

As an employee, the company’s needs come before my own.

**The important decisions in a family should be made by the parents alone, rather than deciding along with the children.**

*Some people possess actual spiritual powers like healing and being able to foresee the future.*

People drop out of high school because of racism and prejudice in the school system.

I would donate my recreational spending money for one month if the head of my religious congregation asked for a donation for necessary repairs to our house of worship.

A basically kind, optimistic person will remain that way, even after surviving a hostage experience.

*When people say they feel joy through spiritual experiences, this is just the power of suggestion.*

**A shift in company policies can make even a hard-working person unemployed and poor.**

Teachers and students should work together to compose classroom rules.

*No other group of people can keep you down if you are determined to succeed.*

*We can receive messages from spirits.*

*Anyone who really wants to work can get a job.*

People can decide to live differently than any way they have ever been taught.

I value my own freedom above even my family relationships.

**Anyone who really values education will be sure to graduate from high school, at least.**

I would rather spend time working on my own projects than serve on the local community board for free.

**Integrative Worldview Framework (IWF; Hedlund-de Witt, de Boer, & Boersema, 2014)**

*It is pure coincidence that human life has developed on earth.*

*I see the earth and humanity as part of an ensouled or spiritual reality.*

I believe the universe gives expression to a creative intelligence.

*What people call ‘God’ does not only exist above, but also here in the world around us.*

Wealth is just as much to be found within ourselves as in the world around us.

*I find the whole idea of ‘spirituality’ or ‘something spiritual’ nonsense.*

**God stands far above life on earth.**

**I have sometimes had experiences that you could call spiritual.**

There is something that connects human being and world in their core.

*I see life as one big growth-process.*

*Science is the only source of trustworthy knowledge.*

Next to science, also feeling and intuition are needed to know reality.

**Earning a lot of money is really important to me.**

**The more money I can spend, the higher the quality of my life.**

**Everybody needs to take care of oneself and stand up for oneself.**

The most important thing in my life is that I enjoy myself and am happy myself.

**I aspire a luxurious and comfortable lifestyle.**

I hardly ever reflect on the meaning and purpose of life.

*Inner growth is really important to me.*

*I want to contribute to society in my own, unique way.*

*I take a moment for reflection, prayer or meditation regularly.*

The human being is the only being on earth with consciousness.

**The suffering that happens to people does not have any meaning.**

Pain and suffering provide me with the opportunity for growth and maturity.

I don't think body and mind are closely connected.

What we do to others will in the end come back to ourselves.

I believe the human being is by nature, that is to say in his core, good.

Human beings are in their core egocentric beings: they think mostly of themselves.

**I believe every human being has a spiritual or divine core.**

*I believe in reincarnation, that is to say, that we will be born again in this world after our death.*

#### **Connection of Soul (COS) Scale (Ai et al., 2014)**

**Physical existence is the only existence I have.**

**After death I come to the community with god.**

*After death my soul connects with the world spirit or the infinite force.*

*When overcoming my ego, I reach enlightenment (Nirvana) and peace.*

**After death the life of body and soul stops.**

After death I become an angel.

*Regarding my life, after death everything is over.*

**After death there is no "afterlife."**

*After death my substance unifies with the universe or the big whole.*

**After death I come to paradise.**

**After death I am unified with the collective consciousness.**

*After death my soul goes to an absolutely peaceful place, the Heaven.*





**The following questions ask about your primary parent(s) or guardian(s). Note that “primary” in this sense means a parent who has more involvement in your life and has spent more time caring after you, not necessarily a blood relative. There are spaces to write about up to four primary parents or guardians: Parent A, Parent B, Parent C, and Parent D.**

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**PARENT/GUARDIAN A:**

What is the occupational status of Parent/Guardian A? Please select all that apply.

- Employed Full-Time (occupation: \_\_\_\_\_)
  - Employed Part-Time (occupation: \_\_\_\_\_)
  - Unemployed or on leave (prior profession, if applicable: \_\_\_\_\_)
  - Student (major/department: \_\_\_\_\_)
  - Other: \_\_\_\_\_
- 

What is the highest level of education achieved by Parent/Guardian A?

- Middle school, elementary school, or less
  - Some high school
  - High school diploma
  - Some college
  - Associate’s or trade degree
  - Bachelor’s degree
  - Professional degree
  - Master’s or doctoral degree
  - Other: \_\_\_\_\_
- 

**PARENT/GUARDIAN B (IF APPLICABLE):**

What is the occupational status of Parent/Guardian B? Please select all that apply.

- Employed Full-Time (occupation: \_\_\_\_\_)
  - Employed Part-Time (occupation: \_\_\_\_\_)
  - Unemployed or on leave (prior profession, if applicable: \_\_\_\_\_)
  - Student (major/department: \_\_\_\_\_)
  - Other: \_\_\_\_\_
- 

What is the highest level of education achieved by Parent/Guardian B?

- Middle school, elementary school, or less
- Some high school
- High school diploma
- Some college
- Associate’s or trade degree
- Bachelor’s degree
- Professional degree
- Master’s or doctoral degree
- Other: \_\_\_\_\_

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**PARENT/GUARDIAN C (IF APPLICABLE):**

What is the occupational status of Parent/Guardian B? Please select all that apply.

- Employed Full-Time (occupation: \_\_\_\_\_)
- Employed Part-Time (occupation: \_\_\_\_\_)
- Unemployed or on leave (prior profession, if applicable: \_\_\_\_\_)
- Student (major/department: \_\_\_\_\_)
- Other: \_\_\_\_\_

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What is the highest level of education achieved by Parent/Guardian B?

- Middle school, elementary school, or less
- Some high school
- High school diploma
- Some college
- Associate's or trade degree
- Bachelor's degree
- Professional degree
- Master's or doctoral degree
- Other: \_\_\_\_\_

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**PARENT/GUARDIAN D (IF APPLICABLE):**

What is the occupational status of Parent/Guardian B? Please select all that apply.

- Employed Full-Time (occupation: \_\_\_\_\_)
- Employed Part-Time (occupation: \_\_\_\_\_)
- Unemployed or on leave (prior profession, if applicable: \_\_\_\_\_)
- Student (major/department: \_\_\_\_\_)
- Other: \_\_\_\_\_

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What is the highest level of education achieved by Parent/Guardian B?

- Middle school, elementary school, or less
  - Some high school
  - High school diploma
  - Some college
  - Associate's or trade degree
  - Bachelor's degree
  - Professional degree
  - Master's or doctoral degree
  - Other: \_\_\_\_\_
-





## **Appendix E: Attempts to Reproduce the Factor Structures of the Initial Five Measures**

Several of the five worldview measures compiled for this research project have not undergone additional analyses (e.g., CFAs or follow-up EFAs on new populations) in order to corroborate their factor structures. Therefore, to test these factor models, both EFAs and CFAs were conducted on each of the five measures in isolation. Data from Study 1 were used in these analyses, as there were items from each measure that were not administered to participants in Study 2. The participant-to-item ratio for the re-analysis of the WAI was roughly 3:1 (below the 5:1 to 10:1 recommendation; Comrey & Lee, 1992). However, all other scales fell between the 5:1 to 10:1 recommendation for sample size.

The EFA conducted on the Worldview Assessment Instrument (WAI) used the same options as the original measure: Principal Axis Factoring with Varimax rotation (Koltko-Rivera, 2000). Five factors were extracted in order to mirror the published WAI factor structure. The first three factors from the original model (metaphysics, locus of responsibility, and agency) were reproduced fairly well with the new data, though there were items that loaded onto these factors that were not a part of the factors in the original model as well as items that were part of the original factors that did not load onto the new factors. The rest of the new factors were a mix of the remaining items and did not mirror the last three factors of the original model (relation to group, relation to authority, and mutability). Using the same procedure as in Study 2 (Lavaan package for R, items standardized and analyzed as ordinal data, and FIML method used for missing data), a CFA was conducted to test the original model fit with this new data set. The model failed to converge, citing a non-positive definite variance-covariance matrix of estimated

parameters as the culprit. According to the EFA and CFA results, it does not appear that the WAI model reproduced well on this data. However, these findings may be adversely affected by the low participant-to-item ratio.

Using the same options as the original study (Principal Components Analysis with Varimax rotation; Devlin, 1995), an EFA was conducted on the Conflicting Worldview Questionnaire (CWQ) factor model. Mirroring the published model, two factors were extracted. Both factors (the Arcadian and Imperial subscales) reproduced very well. No items switched factors, but there were several items that failed to load on either factor at .30 or above. Again, using the same options as in Study 2, a CFA was conducted on this model to test its fit with the new data. Like the WAI, this model failed to converge due to a non-positive definite variance-covariance matrix of estimated parameters. While the EFA reproduced the original model well on this new data, the model still was not able to converge under the CFA. There are several reasons that a model may fail to converge, and not all of them are the result of a poor model (see Kolenikov & Bollen, 2012 for more information).

Next, an EFA was conducted to attempted to reproduce the original Integrative Worldview Framework (IWF) factor structure. The EFA was carried out with the same options as the original model (Principal Components Analysis with Promax rotation; Hedlund-de Witt, Boer, & Boersema, 2014). Based on the original model, five factors were extracted. None of the original five factors (inner growth, contemporary spirituality, traditional god, focus on money, and secular materialism) reproduced well with this new data. Instead, the items were spread across the new five factors in a completely different pattern than the published model. Furthermore, the CFA (using the same options as the

CFA in Study 1) also failed to converge (citing the same reason as the previous two CFAs). While there are many reasons that a model may fail to converge, the fact that the EFA also failed to replicate suggests that this model did not reproduce well on this dataset.

The Scale to Assess World View (SAWV) was then subjected to an EFA using the same options as the original study (Principal Axis Factoring with Direct Oblim rotation; Ibrahim & Owen, 1994). Attempting to reproduce the original factor structure, four factors were extracted. The first two factors (optimistic worldview and traditional worldview) replicated well, though there were a few additional items added to these factors that were part of different factors in the original model. The remaining two factors were a mix of the remaining items and did not resemble to original here-and-now and pessimistic factors. There were also several items that cross-loaded very strongly on multiple factors as well as items that failed to load on any of the four factors at .30 or above. Once again, a CFA with the same specifications as that of Study 2 was conducted on the SAWV, and, once again, the model failed to converge for the same reason as the previous three CFAs. Because both the CFA and EFA failed to replicate the original factor structure of the SAWV, this model did not reproduce well with this new data.

Finally, an EFA was conducted on the Connection of Soul (COS) Scale. Just like in the original study, the EFA was conducted with Principal Axis Factoring and Varimax rotation (Ai et al., 2014). Three factors were extracted in an attempt to reproduce the original model. The factors (secular view, God-centered view, and cosmic-spiritual view) reproduced well with this new data. However, there were more cross-loadings in the new factor solution than in the original factor solution, meaning that the factors were not as

distinct as they were in the original study. Next, the COS was subjected to a CFA with the same options used in the Study 2 CFA. This was the first of these five original models that did not fail to converge. Indeed, the CFA indicated that this model fit the new data extremely well. Looking to the “DWLS” (or “expected”) values (Li, 2016), the Comparative Fit Index (CFI) was found to be .997 (rounded to 1.00), indicating a nearly perfect fit of the model (Schreiber et al., 2006). Additionally, the Root Mean Square Error of Approximation (RMSEA) also shows a close fit of the model to the data with RMSEA equal to .05 (Browne & Cudeck, 1992; MacCallum, Browne, & Sugawara, 1996, as cited by Lai & Green, 2016; 90% Confidence Interval = .01, .07,  $p = .51$ ). This appears to be a very strong model. However, since it only measures death-related beliefs, it cannot be used as a worldview measure on its own. Instead, it can be very useful to combine it with other measures that are lacking death-related beliefs (Ai et al., 2014), like I have done with the present research project.

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