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A new tool to map the major worldviews in the Netherlands and USA, and explore how they relate to climate change

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ABSTRACT

For addressing climate change, public support for changes in policy is needed, as well changes in individual lifestyles. Both of these appear to be intimately related with people's *worldviews*. Understanding these worldviews is therefore essential. In order to research and 'map' them, we translated the theoretical *'Integrative Worldview Framework'* (IWF) into an empirical, quantitative approach. We constructed a worldview-scale aiming to distinguish between four major worldviews – labeled traditional, modern, postmodern, and integrative – and explored their interface with opinions and behaviors with respect to climate change. The survey was conducted with representative samples of citizens in the Netherlands and the USA (n = 527 and n = 556). The hypothesized worldviews were found in the data with a reasonable degree of reliability, especially in the Dutch sample. We also found consistent relationships between these worldview-clusters and a range of opinions, political priorities, and behaviors. In both countries postmoderns and integratives displayed significantly more concern about climate change as well as more sustainable behaviors, compared with moderns and traditionals. The implications of these findings for environmental policy and social science are noteworthy.

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1. Introduction

In order to address climate change, widespread public support for changes in policy is needed, next to changes in individual behaviors and lifestyles. Both such public support as well as such (changes in) lifestyles appear to be intimately related with, and an expression of, people's *worldviews*. Worldviews can be defined as "the inescapable, overarching systems of meaning and meaning-making that inform how humans interpret, enact, and co-create reality" (Hedlund-de Witt, 2013b, p. 156). They are the fundamental 'lenses' through which humans see and filter reality, and they interface with people's perceptions of global issues like climate change in ways that are profound, persistent, and frequently overlooked. Worldviews not only tend to shape how individuals perceive particular issues and their potential solutions, they also tend to influence their willingness to partake in, or politically support, such solutions. Moreover, since worldviews are a

fundamental part of individuals' *identities*, people may react defensively, or even with hostility, when their underlying assumptions and beliefs about reality are called into question—reacting as if they *themselves* were threatened (Brown et al., 2008).

One can see such psychological dynamics in the highly polarized and deeply entrenched societal debate on whether anthropogenic climate change is real, its severity, and what may be viable solutions to addressing the issue (e.g., consider the controversies around genetic modification of food, nuclear energy, and geo-engineering). These debates are not as rational, instrumental, or pragmatic as they may seem, but tend to reflect people's deeper emotional identifications and worldviews. Work of Kahan et al. (2012) showed that, contrary to popular belief, individuals with the highest degree of science literacy and technical reasoning capacity were not the most concerned about climate change. In fact, they were the ones among whom cultural polarization was greatest. The authors conclude that public divisions over climate change do not stem from public's incomprehension of science but from a conflict of interest that can be best explained by fundamental differences in worldview. Hence, rather than understanding these polarized debates as resulting from mere disagreements over the facts, they can be better understood as resulting from clashes over values, over worldviews (De Witt,

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2015; Sarewitz, 2004). Researching the role and dynamics of worldviews is therefore crucial for understanding 'why we disagree about climate change', as Hulme (2009) argued.

However, not any opinion or behavior is necessarily a manifestation of these more fundamental worldviews. Yet in matters of moral importance, which evoke what Taylor (1989) calls "strong evaluations," even seemingly trivial choices may be understood as reflecting worldviews. That is, while for example buying a package of coffee may not express a deep worldview-commitment, once coffee is available that claims to be 'organic' or "fair trade," even purchasing coffee becomes a moral act voicing how individuals understand the world and their own role and responsibility within it. It is also important to note that, as many philosophers have underscored, these worldviews are not optional (see e.g., Hedlund-de Witt, 2013b). As Taylor (1989) argues, humans unavoidably have moral responses to life: we like certain things and dislike others, we aspire for certain goals and ignore others, we value certain qualities while disapproving of others. These frameworks of meaning and meaning-making therefore provide the (frequently implicit) background for our judgments, intuitions, or reactions to life. This means that although these worldviews may have not been reflected upon, and thus may remain subconscious, they still shape – to a great extent – how the world is viewed as well as one's own role and position within it.

Obviously, researching these worldviews, which in many cases exist substantially outside of people's conscious awareness, is not an easy task. However, in the context of generating support for the sweeping policy and lifestyle changes needed for addressing climate change, 'mapping' these worldviews and how they interface with issues such as climate change, has become essential (see e.g., Hedlund-de Witt, 2012; O'Brien, 2009; O'Brien and Wolf, 2010). Unfortunately, currently social science contributions to climate change research lag behind, revealing an important gap that needs to be addressed (Hulme, 2011, 2013; Nisbet et al., 2010). Moreover, while the social sciences have been attempting to measure worldview-related aspects for several decades, most of these approaches have significant limitations (see e.g., Hedlund-de Witt, 2012). For example, while *Cultural Cognition Theory* (Kahan et al., 2010; Kahan et al., 2012), arguably one of the most prominent approaches, is empirically successful in certain ways, it falls short in others. As we argue elsewhere (De Witt et al., 2015), this may be so because this approach is based on the central binary of

Table 1
The IWF ideal-typically delineates traditional, modern, postmodern, and integrative worldviews in the contemporary West, using the five worldview-aspects as organizing scheme (De Witt and Hedlund, in press; Hedlund-de Witt, 2013a).

	Traditional worldview	Modern worldview	Postmodern worldview	Integrative worldview
Ontology	Religious/metaphysical monism. Reality as singular, transcendent. Universe as purposively constructed whole. God-created universe *ex nihilo*. Transcendent God/Creator is separate from profane world; dualism. Nature as embodiment of meaningful, imposed order (e.g. God's creation).	Secular materialism. Reality as singular, immanent. Mechanistic universe brought about by random selection. Material reality devoid of meaning, intentionality, consciousness; dualism, disenchantment. Nature as instrumental, devoid of intrinsic meaning and purpose. Resource for exploitation.	Post-materialism. Reality as pluralistic, perspectival, constructed. Multiple cosmogonies/cosmogony as social construct Reality as discontinuous and fragmented, meaning as social construct; anti-essentialism. Nature as constructed through a plurality of cultural values, meanings, and interests.	Holism/integralism (unity in diversity). Reality as transcendent *and* immanent. Universe as evolving, creative manifestation of Source/Spirit. Outer and inner reality co-arising, interdependent; re-enchantment. Nature as intrinsically valuable. Frequently seen as divine force that humanity is part and expression of.
Epistemology	Naïve realism; emphasis on concrete-literal interpretations of religious doctrine (literalism, dogmatism). Religious/conventional authority (scripture, divine revelation, tradition). Implicit methodology Substantive rationality	(Post-)positivism; emphasis on reality as objectively knowable, (empiricism, reductionism, scientism). Secular authority (science, the state). Quantitative methods; methodological monism. Procedural rationality	Social constructivism; emphasis on reality as constructed (pluralism, relativism). Internalization of authority (e.g. moral, emotional, intuitive, artistic knowing) Qualitative methods; methodological pluralism Skeptical rationality?	Critical realism, pragmatism; emphasis on reality as approachable through integration of sources of knowledge Triangulation of authority (scientific, spiritual/religious/philosophical, and subjective knowing) Mixed methods; integrative pluralism Synthetic rationality?
Axiology	Traditional values (e.g. security, tradition, conformity, obedience, humility) Emphasis on community, family Pre-conventional morality?	Rational-secular, materialist values (e.g. power, achievement, hedonism, stimulation) Emphasis on independent individuality Conventional morality?	Self-expression, post-materialist values (e.g. openness to change, self-direction) Emphasis on unique individuality Postconventional morality?	Self-expression/self-transcendence values (e.g. universalism, self-actualization)? Emphasis on embedded, relational individuality Universal morality?
Anthropology	Humanity in managerial stewardship role vis-à-vis nature Prime purposes determined by larger order and social roles. Human being as sinful/fallen from grace. Dependent on religious/metaphysical authorities for salvation. Ethnocentric identity?	Humanity in promethean control over nature Prime purposes of a material, hedonistic nature. Human being as self-optimizing, independent being. *Homo economicus*. Sociocentric identity?	Humanity in cautious relationship to nature Prime purposes are found within, intrinsic. Human being as self-expressing, unique individual. Worldcentric identity?	Humanity in unity and synergy with nature Prime purposes found within, serving the larger whole ('service through self-actualization'). Human being as evolutionary co-creator, with a vast—though generally unrealized—potential. Planetcentric identity?
Societal vision	Traditional societies, emphasis on (subsistence) farming. Traditional and religious authorities and values as source of solutions to societal and environmental problems.	Industrial societies, emphasis on mechanized modes of production (e.g. industrial/conventional agriculture). Technological optimism: science and technology as solutions to societal and environmental problems.	Post-industrial societies, emphasis on service economy and creative industries. Scepticism of status quo, idealism: mobilization of the public through revealing injustices as prime solution to societal and environmental problems.	Increasing emphasis on services, creative industries, and social/sustainable entrepreneurship. Integrative vision: emancipation of the public through consciousness growth and a synthesis of interests and perspectives as solutions to societal and environmental problems

egalitarian-collectivist versus individualistic-hierarchical world-views, while a more dynamic and developmental approach may in fact be in better alignment with the historical thrust of evolving worldviews in the West, as numerous philosophers and sociologists have described it (e.g. Giddens, 2009; Habermas, 1976; Inglehart, 1997; Inglehart and Welzel, 2005; Tarnas, 1991; Taylor, 1989). Moreover, Cultural Cognition Theory does not seem to measure worldviews in their full complexity and breadth, as it does not incorporate items addressing the entire spectrum of world-view-related questions (De Witt et al., 2015). And while for example the *World Values Survey* approach (e.g., Inglehart, 2008; Inglehart and Welzel, 2005), the largest empirical and longitudinal data base exploring global changes in beliefs and values, is much more comprehensive and based on a dialectical understanding of human development, it does not seem to account or probe for newly emerging worldviews, nor is it focused on advancing an understanding of issues such as climate change.

In order to address and overcome these limitations, we have attempted to develop a more comprehensive, effective, and dynamic approach to researching and mapping these worldviews and how they interface with a range of environmental issues such as climate change. First, we have explored a range of philosophical and sociological sources and their understanding of worldviews (Hedlund-de Witt, 2013b), while also including more empirical, psychological approaches (Hedlund-de Witt, 2012). This resulted in an interdisciplinary framework that synthesizes research from a number of fields, called the *Integrative Worldview Framework*, abbreviated as IWF (De Witt and Hedlund, in press; Hedlund-de Witt, 2013a, 2014b). One of the strengths of this framework is that it is grounded in a qualitative understanding of the general thrust of the historical-developmental trajectory of cultural epochs and worldviews in the West (as described by historians, philosophers of Western thought, and sociologists), while simultaneously bridging to more quantitative, psychological approaches—all in service of understanding societal responses to climate change and other planetary concerns.

The IWF delineates and operationalizes worldviews into five major aspects, namely *ontology, epistemology, axiology, anthropology*, and *societal vision*, and offers a synoptic overview of the major worldviews in the West, referred to as *traditional, modern, postmodern*, and *integrative* worldviews. For a schematic overview of this framework, see Table 1. Earlier research has demonstrated its usefulness for understanding the relationship between worldviews and the sustainability of individuals' lifestyles, both conceptually (Hedlund-de Witt, 2012) and empirically (Hedlund-de Witt et al., 2014), as well as for understanding the relationship between worldviews and perceptions of biotechnology (De Witt et al., 2015), although in these studies the newer (and still somewhat more speculative) integrative worldview was not included.

In the current study we have translated this framework into a new, empirical approach by constructing a worldview-scale that aims to quantitatively distinguish between these four major worldviews, while exploring their interfaces with basic choices and commitments regarding climate change and the contribution of lifestyle changes to its mitigation. The aim of this study, thus, is to contribute to the development of a scientific, yet philosophically informed, approach to mapping worldviews, and their interface with individual and societal responses to climate change. Simultaneously, this study allows us to 'test' the more theoretical approach of the IWF, by revealing to what extent these worldviews show up empirically and display significant correlations with opinions and behaviors. Since we are hoping to provide insights into the generalizability of our work, and develop a method that can be applied internationally, the survey was conducted with representative samples of citizens in the Netherlands and the USA (n = 527 and n = 556).

2. Methodology

2.1. Development of the worldview-scale

We used the *Integrative Worldview Framework* (De Witt & Hedlund, in press; Hedlund-de Witt, 2013a; Hedlund-de Witt et al., 2014) as theoretical background and blueprint for developing the worldview-scale. The IWF operationalizes the concept of world-view through distinguishing between five different aspects of worldviews (ontology, epistemology, axiology, anthropology, and societal vision), as well as four different categories of worldviews (traditional, modern, postmodern, and integrative).

Using these five aspects and four categories of worldviews, we systematically developed nineteen different sets of four statements. Every set formulates four qualitatively different perspectives, thereby representing the four different worldviews, on a different topic, with each topic related to one of the five aspects of worldviews. For example, for the topic of metaphysics, which is part of the aspect of ontology, we developed the following four statements:

1. God stands far above life on earth (traditional)
2. The universe is governed by mechanical, natural laws (modern)
3. People look at the world from different perspectives, which are all equally valid (postmodern)
4. Reality is complex: it is both scientific and spiritual at the same time (integrative)

The first statement formulates an ideal-typically traditional perspective on this topic, the second an ideal-typically modern view, the third a postmodern, and the fourth an integrative view. In a similar fashion, we developed sets of statements for other topics within the aspect of ontology, as well as within each of the other aspects. In this way, we attempted to develop a four-dimensional scale that is comprehensive in range and overcomes the shortcomings of existing approaches attempting to measure worldviews as discussed in Section 1.

The development of the scale was a process with many intermediate stages. To generate the 19 sets of 4 statements we had to formulate 76 meaningful statements. In order to generate the different topics and statements, we used Table 1 as well as existing survey-research such as the World Values Survey (2010–2012 wave), our own earlier research (Hedlund-de Witt, 2012; Hedlund-de Wittet al., 2014), Cultural Theory (Thompson et al., 1990), and the "Global warming's six Americas" report (Leiserowitz et al., 2013). Then (in December 2013), the statements were pre-tested in a representative sample (n = 150) of the Dutch population. Studying the results of this sample allowed us to refine our formulation of the four worldview-perspectives and improve the scale. In the final questionnaire, the sets as well as the statements within the sets were presented in randomized order.

Respondents were asked to select the item they most agreed with as well as the item they least agreed with. This method, also called the *best–worst scaling approach* (Lee et al., 2008), can be used to measure the relative importance or perceived trade-offs among choice alternatives. Important advantages of this approach are that it offers more discrimination than conventional rating scales and that it is better fit for cross-cultural research. In a study of the Schwartz Value Survey, this approach was found to take significantly less respondent time than the approach in which respondents are asked to rank each of the items per set, while being able to reproduce similar results and relationships as the ones generated with the more traditional approach (Lee et al., 2008). With this approach the predominant worldview of the participants can be identified by comparing their number of

choices in favour of each of the four worldviews, after subtracting the number of choices made against each of them.

Next to the nineteen worldview-sets, we also developed a host of questions that inquire into opinions and behaviors with respect to climate change and energy. In Section 2.3 we discuss these criterion variables in detail.

2.2. Participants and procedures

The questionnaire was conducted between April 15th and May 7th 2014 by Motivaction, a Dutch research agency, which has a panel of research respondents of about 100,000 people in the Netherlands, and years of experience with online surveys. Because online panel research is self-selective (as respondents decide whether or not to participate in the research), Motivaction uses *propensity scores* (Rosenbaum and Rubin, 1983) in order to correct for the non-response generated by this type of research. Propensity scores allow the researcher to model the sample on specific reference variables, not only including socio-demographic variables but also incorporating variables such as opinion, lifestyle, and values. For the correlational analyses applied in this study, sample sizes of about 500 are considered sufficient (Hogarty et al., 2005).

In the Netherlands, the questionnaire was conducted with 527 participants. The response rate of the questionnaire (25%) was deliberately brought down as respondents of subgroups that are known to respond slowly are approached more frequently, aiming to create a more representative sample. After the fieldwork was finished, the gathered data were weighted as to correct any obliquity of the sample in comparison with the Dutch public. In this way, the sample was made representative for the Dutch public on the variables of gender, age, education, region, and value orientation (mentality-environment).[1] A weighting factor of 0.89 was used, meaning that the efficiency of the weighting was 89%. The effective sample after weighting thus consisted of 478 Dutch respondents. The respondents consisted of 49.9% men and 50.1% women. In the USA, the questionnaire was conducted with 556 participants. Here the sample was made representative using the variables of gender, age, and education. A weighting factor of 0.90 was used (efficiency of the weighting 90%). The effective sample after weighting consisted of 500 American respondents.

The age of the respondents in both samples was minimum 18 years and maximum 70 years old. Participants in this study thus consisted of two representative sample of residents of the Netherlands and of the USA, who were invited via email for participation in the research. In order to prevent a selective response, the topic of the research was not mentioned. The respondents filled in the questionnaire online. We expect that this online approach does not substantially limit the representativity of the sample, as both the Netherlands and the USA have a high degree of internet penetration. In the Netherlands, in 2011 94% of the households in the population under 75 years of age had access to internet *at home* (CBS, 2012). In the USA, the internet penetration was estimated to be around 86.7% (www.internetlive-stats.com/internet-users-by-country). For filling in the complete questionnaire, respondents received a modest compensation.

2.3. Criterion variables

A small set of criterion variables was chosen in order to examine the interfaces of the four worldviews with basic choices and commitments regarding climate change and the contribution of lifestyle changes to its mitigation.

Political priorities were measured by the question "When you are considering your vote for the next elections, which three themes play the most important role in your choice of a political party?" The randomized themes included economy and employment; fair distribution of incomes; animal rights; traditional values; environment, sustainability, and climate change; health care; integration of immigrants; education; emancipation of women; safety and terrorism.

The topic of climate change was addressed by items that asked for the perceived relevance of climate change to the participants, and their willingness to personally make energy-saving lifestyle-changes. The perceived relevance was measured by the item: "How important is the issue of climate change to you personally?" (1 Not at all important—4 Very important). For a number of lifestyle changes the participants were asked whether they were willing to personally make that lifestyle-change (1 Certainly not willing—4 Certainly willing). The options were: willingness to save energy at home; install solar panels on my house; drive less; fly less; and buy (more of) my clothes and furniture second-hand (each presented with the note "if you are already doing it, you are willing"). We included the small numbers of don't know responses as a middle category (2.5). The five 4-point scale items were used to form a scale. A separate item asked the participants to indicate "How many days a week do you eat meat (including chicken) with your main meal, on average?"

2.4. Analysis

A multiple step approach was applied to identify the predominant worldview of the participants in both samples. First, it was necessary to transform each of the 19 sets of 4 statements into a 3-point scale, with 1 meaning "statement chosen as best option," 0 "not chosen," and −1 "chosen as worst option." Based on these data, it was possible to assess for each participant the number of choices in favour and against each of the four worldviews. The measurement model assumed that they were able to make their choices in a relatively consistent way and that their positive choices of a worldview statement could be summed and the negative ones subtracted.

The consistency of the choices was tested by a reliability analysis of the choices regarding each of the worldviews separately. Cronbach's coefficient alpha is the most widely used estimator of the reliability of scales. The desirable level of alpha is between 0.70 and 0.90, whereas for newly developed scales, a lower alpha value such as 0.6 is allowable (Peterson, 1994). In addition, multidimensional scaling (PROXSCAL algorithm implemented within SPSS) was applied to visualize the positions of the 76 items in a multidimensional space (not shown due to space limitations). Next, the scores of each participant on the four resulting worldview scales were compared to identify the scale with the largest number of positive choices. The latter was considered the participant's predominant worldview. For this step of our approach, the four worldview-scales were used in a cluster analysis to classify clusters of participants with the same predominant worldview (clustering is the unsupervised classification of observations into groups (see Jain et al., 1999).

To determine the desired number of clusters, we employed the hierarchical Ward approach with a squared Euclidian distance measure (Jain et al., 1999). Although there are no hard rules for determining the number of clusters, inspection of the agglomeration schedule revealed a sudden jump in the distance coefficient between five and four clusters, which indicated that five clusters is the best choice for the Dutch sample (while also being acceptable for the US sample). In addition, K-means cluster analysis (Jain et al.,

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[1] Motivaction developed its own model for describing the different value orientations within the Netherlands, which they call "mentality-environments." See www.motivaction.nl for more information; this site has an English section.

Table 2
Overview of the worldview statements: item mean (M) and standard deviation (SD) in both samples.

Items[a]	Dutch sample		USA sample	
	M	SD	M	SD
Ontology 1: Metaphysics				
O1t God stands far above life on earth	−0.35	0.78	0.04	0.74
O1m The universe is governed by mechanical, natural laws	−0.04	0.65	−0.24	0.68
O1p People look at the world from different perspectives, which are all equally valid	0.31	0.66	0.01	0.68
O1i Reality is complex: it is both scientific and spiritual at the same time	0.08	0.58	0.18	0.66
Ontology 2: Values of nature				
O2t Nature is created by God and is therefore valuable	−0.29	0.83	0.16	0.77
O2m Nature has value because humans are able to use and enjoy it	0.16	0.62	−0.04	0.62
O2p People ascribe different values to nature, and all of them are important	−0.03	0.57	−0.02	0.68
O2i Nature has value in and of itself, even if it has no value for humans whatsoever	0.17	0.69	−0.10	0.73
Ontology 3: Origin of life				
O3t Life was miraculously created by a higher power	−0.20	0.81	0.20	0.77
O3m Life was brought about through biological evolution (so NOT steered by a higher power)	0.12	0.77	−0.21	0.71
O3p How life originated is still unclear, despite what science and religion say about it	0.26	0.60	0.09	0.67
O3i I see the universe as a creative expression of an evolving consciousness or 'Spirit'	−0.18	0.49	−0.07	0.61
Ontology 4: Views on nature (excluded)				
O4t Nature can be harsh and unpredictable, but humans can correctly steward it	−0.23	0.67	−0.19	0.63
O4m Nature is adaptable and robust, so it will readily recover from the damage caused by us	−0.22	0.69	−0.30	0.65
O4p Nature is fragile, so humans can easily destroy its delicate balance	0.20	0.64	0.21	0.71
O4i Nature is more complex and mysterious than any single perspective can capture	0.24	0.68	0.28	0.65
Epistemology 1: Role of science				
E1t We depend too much on science and not enough on faith	−0.20	0.77	−0.05	0.78
E1m Science is the ultimate source of trustworthy knowledge	0.10	0.75	−0.19	0.74
E1p Morality, art, and intuition are just as important as science for gaining knowledge about the world	0.08	0.60	0.02	0.58
E1i In order to come to a real understanding of the world, science needs to be integrated with other forms of knowledge, such as spiritual insight	0.01	0.66	0.22	0.65
Epistemology 2: Impacts of science and technology				
E2t One of the negative effects of science and technology is that it breaks down people's ideas of right and wrong	−0.42	0.66	−0.29	0.69
E2m Science and technology are definitely making our lives healthier, easier, and more comfortable	0.07	0.74	0.16	0.70
E2p Science is often corrupted by special interests, such as big corporations	0.18	0.65	0.05	0.73
E2i Science and technology can make beneficial contributions when society is actively engaged with the implications of technological developments	0.17	0.59	0.07	0.62
Epistemology 3: Authority—"When I'm forming an opinion on an issue . . . "				
E3t . . . I tend to trust traditional or religious leaders	−0.63	0.59	−0.35	0.67
E3m . . . I tend to trust scientists and other experts	−0.03	0.56	−0.21	0.61
E3p . . . I tend to trust my own judgment, feelings, and intuition	0.51	0.60	0.40	0.67
E3i . . . I try to honor all perspectives and combine them into a larger whole	0.14	0.56	0.16	0.62
Axiology 1: Central values—"The most important thing in my life is . . . "				
X1t . . . to be of service to my family and community/country	0.14	0.63	0.30	0.67
X1m . . . to be successful and have people recognize my achievements	−0.30	0.59	−0.27	0.69
X1p . . . to do things my own way and forge my own path in life	0.51	0.63	0.09	0.71
X1i . . . to actualize my inner potential and thereby serve the (cultural) evolution of humanity	−0.35	0.60	−0.13	0.63
Axiology 2: Central values—"It is very important to me . . . "				
X2t . . . to adapt myself to others and behave appropriately and socially	−0.08	0.73	−0.13	0.71
X2m . . . to have enough money to have and do nice things	0.05	0.72	−0.10	0.77
X2p . . . to be imaginative and express myself in the way I think and live	0.17	0.64	0.19	0.64
X2i . . . to explore my inner world so I can live from my 'true' or 'deeper' self	−0.14	0.70	0.04	0.66
Axiology 3: Central ethics—"For me, to live a good life is . . . "				
X3t . . . to respect the tradition and honor my community	−0.22	0.66	0.06	0.66
X3m . . . to be independent and do whatever I enjoy	0.26	0.81	0.01	0.79
X3p . . . to support those who are oppressed and dominated	−0.05	0.56	−0.07	0.66
X3i . . . to offer my unique 'gifts' to the larger whole I am part of	0.01	0.70	0.01	0.70
Axiology 4: Preferred lifestyle—"I strive for . . . "				
X4t . . . a sober, simple, and humble lifestyle	−0.34	0.70	−0.05	0.74
X4m . . . a comfortable and fun lifestyle	0.41	0.71	0.20	0.69
X4p . . . a diverse and expressive lifestyle	−0.10	0.64	−0.21	0.72
X4i . . . a more wholesome and natural lifestyle	0.03	0.56	0.06	0.60
Anthropology 1: Self-identity				
A1t Who I am is defined by my religion and upbringing	0.07	0.74	−0.01	0.79
A1m Who I am is defined by my social position and/or my achievements	−0.09	0.73	−0.19	0.70
A1p I feel to be more a citizen of the world than a citizen of a country	0.04	0.65	0.02	0.63
A1i I feel part of the vast interconnected whole that is life and the universe	−0.02	0.70	0.18	0.66
Anthropology 2: The human being (excluded)				
A2t The human being is the only being on earth with consciousness	−0.44	0.66	−0.26	0.66
A2m Human behavior tends to be rational and functional	−0.03	0.59	−0.18	0.61
A2p Human beings think mostly of themselves	0.53	0.64	0.22	0.74
A2i I think humans have an unlimited potential	−0.06	0.57	0.22	0.67
Anthropology 3: The human-nature relationship				
A3t Humans should behave as protectors of creation	0.06	0.71	0.23	0.67
A3m By mastering nature, the human being can find freedom	−0.23	0.64	−0.33	0.65
A3p Things in nature are generally more perfect than those made by humans	0.45	0.65	0.24	0.68
A3i On a deep level, I feel to be one with nature	−0.28	0.57	−0.14	0.66
Anthropology 4: Interference in nature				

Table 2 (*Continued*)

Items[a]	Dutch sample		USA sample	
	M	SD	M	SD
A4t When it comes to interfering with nature, mankind has no right to play God	−0.14	0.75	0.13	0.74
A4m Humans can improve on nature	−0.14	0.74	−0.24	0.67
A4p Interfering with nature is risky because it may be too complex for us to understand	0.07	0.65	−0.04	0.66
A4i Aware of their deep connectedness, humans and nature can work together in mutually enhancing ways.	0.21	0.63	0.15	0.68
Anthropology 5: Nature and role of suffering				
A5t The suffering that happens to people is the will of God	−0.68	0.57	−0.28	0.68
A5m The suffering that happens to people does not have meaning but is random	0.21	0.65	−0.13	0.66
A5p The suffering in the world is created and maintained by existing power structures	0.35	0.62	0.07	0.66
A5i I use the pain and suffering in my life as opportunities for growth and development	0.11	0.49	0.34	0.68
Anthropology 6: Nature of death				
A6t In an afterlife we will be punished or rewarded for our actions in this life	−0.23	0.77	0.13	0.75
A6m I don't believe in an afterlife of any form	−0.08	0.69	−0.30	0.63
A6p I don't know what happens to us after we die	0.42	0.58	0.23	0.67
A6i I believe in reincarnation—that is to say that we will be born again in this world after our death	−0.11	0.60	−0.06	0.65
Societal vision 1: Relationship individual—society				
S1t Each individual needs to sacrifice his/her desires to serve the community and society at large	−0.39	0.62	−0.32	0.64
S1m Everybody needs to take care of, and stand up for, oneself	−0.14	0.71	0.14	0.71
S1p Society should offer decent care for every individual in society	0.40	0.61	0.13	0.69
S1i When individuals thrive and blossom, they naturally start working for a better world for all	0.12	0.63	0.05	0.68
Societal vision 2: Societal aims—"In society . . . "				
S2t . . . we should have greater respect for religious authority and tradition	−0.24	0.78	−0.05	0.80
S2m . . . we should place more emphasis on science and technology	−0.01	0.63	−0.11	0.68
S2p . . . we should place more emphasis on art, culture, and moral development	0.00	0.64	0.06	0.65
S2i . . . we should place more emphasis on inner growth and self-actualization	0.25	0.68	0.10	0.68

[a] Each item was transformed into a 3-point scale, with 1 meaning "chosen as best option," 0 "not chosen," and −1 chosen as "worst option".

1999) was used to segment participants into five distinct clusters. Differences between clusters were substantiated by discriminant analysis.

The criterion variables included three attitude scales, which were checked by a reliability analysis and correlation analysis. For reasons of presentation, the multi-item scales were transformed into z-scores ($M = 0$, $SD = 1$) so that results could be reported in standard deviation units. To find out how the five clusters were related to the criterion variables the differences in the mean scores of the clusters on the criterion variables were compared for significant differences. One-way ANOVAs with Bonferroni's post hoc test were used for interval data; chi square for dichotomous data (Tabachnick and Fidell, 2007).

The same procedure was applied to examine differences between the clusters in the descriptive variables gender, age, and level of education. All analyses were conducted with SPSS 21 for Windows.

3. Results

3.1. The worldview items and the worldview-scales

Table 2 presents an overview of all the worldview statements (per set), and the mean and standard deviation for each item, in both samples. Due to the transformation of the items into a 3-point scale, a positive mean indicates that the item was chosen more often as best, rather than as worst item.

The reliability analysis showed that two of the nineteen sets of items had a negative effect on the whole. These were the 'ontology 4′ set, which described different views on nature (inspired by Cultural Theory), as well as the 'anthropology 2′ set, which gives different perspectives on the nature of the human being. In our further analysis we have excluded these two sets. Then, we created Tables 3 and 4, which show the correlations between each item and the rest of its worldview-scale taken together, as well as the alpha, mean, and standard deviation of the scale as a whole, for the Dutch and the American sample.

As we can see in Table 3, which portrays the results of the Dutch sample, the Cronbach's alpha's of the traditional and modern worldview-scales were fairly high (0.88 and 0.80 respectively), while the postmodern and integrative were a bit weaker (0.53 and 0.62). However, considering the breadth of these worldviews and the great variety in topics they articulate, it is not surprising that correlations were not that high in general, especially with respect to the newer, less well-known and less-researched worldviews. As Table 4 shows, in the US sample the Cronbach's alpha's of the traditional and modern worldview-scales were also decently high (0.80 and 0.68 respectively), while the postmodern and integrative were substantially weaker (0.39 and 0.45). In both samples the postmodern worldview appeared to be the least distinctive and reliable of the four worldviews.

The results of the reliability analyses agreed with the results of the multi-dimensional scale analysis (not shown here). This analysis visualized the positions of the 76 items in a multidimensional space; it separated the traditional and the modern items in two homogeneous sets of items and the postmodern and the integrative items in two less homogeneous sets.

As also shown in Table 3, the postmodern worldview had the highest mean, and thus was scored the highest by the Dutch population, while the traditional worldview had the lowest mean, and thus was scored the lowest. The mean scores of the four worldview-scales were substantially different in the American sample, where the traditional worldview scored much higher than in the Netherlands, and the modern worldview scored lower.

3.2. Cluster-analysis

The results of the hierarchical cluster analysis with the four worldview-scales as clustering variables suggested a five-cluster-solution that was theoretically meaningful. In each country, four clusters contained participants with a predominant worldview as revealed by high scores on one of the worldview-scales and low scores on at least one of the others (see Tables 5 and 6, which

Table 3
Scale descriptors: correlations between each item and the rest of its worldview-scale, alpha, *M* and *SD*, Dutch sample.

Set to which the item belongs	Scales			
	Traditional	Modern	Postmodern	Integrative
Ontology 1: Metaphysics	0.69	0.37	0.25	0.21
Ontology 2: Values of nature	0.77	0.32	0.19	0.17
Ontology 3: Origin of life	0.72	0.52	0.10	0.13
Epistemology 1: How to know/role of science	0.62	0.61	0.20	0.32
Epistemology 2: Impacts of science and technology	0.30	0.30	0.05	0.12
Epistemology 3: What has authority	0.57	0.32	0.15	0.19
Axiology 1: Most important in my life	0.38	0.27	0.24	0.30
Axiology 2: Central values	0.20	0.41	0.21	0.26
Axiology 3: Central ethics	0.48	0.52	0.01	0.33
Axiology 4: Preferred lifestyle	0.40	0.40	0.10	0.27
Anthropology 1: Self-identity	0.42	0.37	0.18	0.31
Anthropology 3: The human-nature relationship	0.44	0.33	0.28	0.18
Anthropology 4: Interference in nature	0.48	0.34	0.16	0.23
Anthropology 5: Nature and role of suffering	0.38	0.31	0.16	0.10
Anthropology 6: Nature of death	0.70	0.38	0.30	0.28
Societal vision 1: Relationship individual–society	0.34	0.33	0.17	0.19
Societal vision 2: societal aims	0.66	0.51	0.31	0.24
Alpha of the 17 items	**0.88**	**0.80**	**0.53**	**0.62**
Scale mean	−4.13	0.33	3.59	0.22
Standard deviation of the scale	7.03	5.75	3.61	3.93

Bold values are the aggregate alpha's, the alpha of the total of items (so gives more of an overview).

Table 4
Scale descriptors: correlations between each item and the rest of its worldview-scale, alpha, *M* and *SD*, USA sample.

Set to which the item belongs	Scales			
	Traditional	Modern	Postmodern	Integrative
Ontology 1: Metaphysics	0.64	0.35	0.08	0.13
Ontology 2: Values of nature	0.60	0.17	0.13	0.04
Ontology 3: Origin of life	0.62	0.38	0.09	0.10
Epistemology 1: How to know/role of science	0.54	0.48	0.15	0.17
Epistemology 2: Impacts of science and technology	0.18	0.18	0.04	0.20
Epistemology 3: What has authority	0.46	0.34	0.06	0.15
Axiology 1: Most important in my life	0.34	0.25	0.19	0.22
Axiology 2: Central values	0.15	0.28	0.18	0.21
Axiology 3: Central ethics	0.24	0.32	0.08	0.15
Axiology 4: Preferred lifestyle	0.17	0.23	0.11	−0.01
Anthropology 1: Self-identity	0.52	0.31	0.15	0.16
Anthropology 3: The human-nature relationship	0.11	0.26	0.05	0.13
Anthropology 4: Interference in nature	0.35	0.21	0.14	0.18
Anthropology 5: Nature and role of suffering	0.34	0.19	0.15	0.12
Anthropology 6: Nature of death	0.47	0.24	0.17	0.16
Societal vision 1: Relationship individual–society	0.17	0.05	0.10	0.12
Societal vision 2: societal aims	0.60	0.42	0.14	0.18
Alpha of the 17 items	**0.80**	**0.68**	**0.39**	**0.45**
Scale mean	−0.26	−2.04	1.25	1.06
Standard deviation of the scale	5.97	4.76	3.47	3.57

Bold values are the aggregate alpha's, the alpha of the total of items (so gives more of an overview).

present the sizes of the different clusters and show how each cluster scored on the four worldview-scales in both samples).

That is, the traditionalists scored high on the traditional worldview and remarkably low on the modern worldview. The moderns scored high on the modern worldview, and low on the traditional one. The postmoderns scored high on the postmodern worldview, and low on the traditional one. The integratives scored high on the integrative worldview and low on both the traditional and the modern one. The fifth cluster contained participants with mixed scores: they stand out by not consistently scoring high or low on any of the four worldview-scales. A linear discriminant function that was used to classify the participants into the five clusters showed that overall 97.2% of the Dutch sample and 97.5% of the American sample were correctly classified.

In the Dutch sample, the mixed group scored highest on the postmodern scale, with a mean score of 2.14. This mean is low

compared to the other clusters, which all scored at least 6.9 on their 'own' (most popular) worldview—that is, the worldview we named the cluster after. The mixed cluster thus appears to consist of individuals who cannot be satisfyingly categorised in the current worldview-conceptualization of the IWF. This group is quite big in both samples, with 27% in the Dutch and 28% in the American sample. However, taking them 'out' by ascribing them to the mixed cluster, rather than holding on to a categorization in four worldviews, results in a more 'pure' picture of the four worldviews, and therefore a more adequate result overall.

The cluster-analysis with results of the American sample showed that a three-cluster solution would empirically give the best results (with 49% in a traditional cluster, 20% in a postmodern-integrative cluster, and 31% in a modern-mix cluster). However, because we wanted to be able to compare the results, we choose a five-cluster-solution here too. The overall profile is less distinctive

Table 5
Differences between the clusters for the clustering variables (worldviews) and the descriptive (demographic) variables, Dutch sample.

	Traditional (n = 80)	Modern (n = 116)	Mixed (n = 142)	Postmodern (n = 129)	Integrative (n = 59)	Total (n = 527)	
Cluster size (in%)	15%	22%	27%	24%	11%	99%	
Clustering variables							
Mean traditional scale	**8.28**	−9.25	−0.78	−10.45	−5.11	−4.13	F = 759, p < 0.001
Mean modern scale	−7.02	**7.67**	−0.08	1.66	−6.09	0.33	F = 420, p < 0.001
Mean postmodern scale	0.32	3.60	**2.14**	**6.90**	4.23	3.59	F = 80, p < 0.001
Mean integrative scale	−1.58$_a$	−2.02$_a$	−1.28$_a$	1.90	**6.98**	0.22	F = 141, p < 0.001
Descriptive variables							
% female	56%$_{a,b}$	37%$_b$	48%$_{a,b}$	55%$_a$	56%$_{a,b}$	50%	Chi^2 = 11.5, p < 0.05
Mean age (years)	43$_a$	41$_a$	42$_a$	43$_a$	46$_a$	42	F = 1.4, p > 0.05
% with higher education	24%$_a$	31%$_a$	18%$_a$	31%$_a$	32%$_a$	32%	Chi^2 = 12.7, p > 0.05

Note: Each subscript letter denotes a subset of clusters whose means or column proportions do not differ significantly from each other (Bonferroni, p < 0.05). The test results are affected by the size of the clusters.
Bold values emphasize per cluster (traditional, modern, mixed, postmodern, integrative), the worldview-scale they score highest on, on average.

Table 6
Differences between the clusters for the clustering variables and the descriptive variables, USA sample.

	Traditional (n = 154)	Modern (n = 78)	Mixed (n = 157)	Postmodern (n = 64)	Integrative (n = 103)	Total (n = 556)	
Cluster size (in%)	28%	14%	28%	12%	19%	101%	
Clustering variables							
Mean traditional scale	**6.63**	−7.06	**0.71**	−9.49	−1.11	−0.26	F = 713, p < 0.001
Mean modern scale	−5.84$_a$	**4.80**	0.39	−0.92	−5.97$_a$	−2.04	F = 283, p < 0.001
Mean postmodern scale	−0.21$_a$	2.15$_b$	−0.57$_a$	**6.12**	2.47$_b$	1.25	F = 87, p < 0.001
Mean integrative scale	−0.57$_a$	0.11$_a$	−0.54$_a$	4.29$_b$	**4.61$_b$**	1.06	F = 93, p < 0.001
Descriptive variables							
% female	56%$_a$	37%$_a$	45%$_a$	54%$_a$	54%$_a$	50%	Chi2 = 10.4, p < 0.05
Mean age (years)	44$_a$	38$_{b, c}$	38$_{b, c}$	41$_{a, c}$	42$_{a, c}$	40	F = 5.9, p < 0.001
% with higher education	49%$_a$	62%$_{a, b}$	51%$_a$	75%$_b$	71%$_b$	58%	Chi2 = 25.2, p < 0.01

Note: Each subscript letter denotes a subset of clusters whose means or column proportions do not differ significantly from each other (Bonferroni, p < 0.05). The test results are affected by the size of the clusters.
Bold values emphasize per cluster (traditional, modern, mixed, postmodern, integrative), the worldview-scale they score highest on, on average.

due to the weak postmodern and integrative scales. The mixed cluster scores highest on the traditional scale, though still low with a mean of 0.71. Noteworthy is also that the integrative cluster does not score much higher on the integrative scale than on the postmodern one (4.61 compared with 2.47); however, like in the Dutch sample, the integratives distinguish themselves by their low score on the modern scale (−5.97).

In Tables 5 and 6 we also show some of the notable differences between the clusters in terms of descriptive variables, such as gender and education. In terms of gender we see in both samples that men appear to be more often found in the modern cluster, while women are more often found in the traditional, postmodern, and integrative clusters. In terms of education we find, also in both samples, that highly educated individuals are more often found in the modern, postmodern, and integrative clusters, while low educated individuals are more often found in the traditional and mixed clusters. However, not all of these differences were found to be significant.

3.3. The five clusters and their relationships with opinions and behaviors

Then we analysed how the different clusters score on different variables, such as with respect to their political preferences, opinions, and environmental behaviors. The criterion variables included one attitude scale, namely the willingness to save energy (5 items, alpha = 0.65 in the Dutch sample and 0.62 in the American sample).

With respect to political priorities, we find substantial differences between the five clusters (see Tables 7 and 8 below). For example, while 'animal rights' was in the Dutch sample chosen by

11% as a top political priority, only 1% of the traditionalists chose this one, while almost 24% of the integratives did. Not surprisingly, moderns valued 'economy and employment' disproportionally high (66% mentioned it, compared with the sample average of 47%), while traditionals frequently chose 'traditional values' (52% compared with the sample average of 20%). Particularly integratives, but postmoderns as well, scored high on environment, sustainability, and climate change (52% and 38%, compared with the sample average of 18%). In the American sample, these differences are a bit less sharp,[2] though the general tendencies are similar. For example, postmoderns and integratives scored high on environment, sustainability, and climate change (45% and 33%, compared with the American sample average of 22%), while traditionals scored high on traditional values (27%, in comparison with the sample average of 16%).

Several variables were used to measure opinions and behaviors regarding climate change and energy saving. The clusters showed different means with respect to the measure of the personal importance of climate change: the lowest mean was found among the moderns (Dutch sample) and the traditionals (USA sample), the highest mean among the integratives (Dutch sample) and the postmoderns and integratives (USA sample). The items on climate related behavior showed the same patterns of results. In the Dutch sample, there were significant differences between the moderns, who had a high number of 'meat days' (average amount of days a week of eating meat, which is a high-impact behavior in terms of climate change) and a low level of willingness to make energy

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[2] For example, in all clusters 'economy and employment' got scored most frequently as one of three top political priorities (in contrast with the Dutch sample, where these high percentages were only found in the modern cluster).

Table 7
Differences between the clusters for the criterion variables, Dutch sample.

	Traditional (n = 80)	Modern (n = 116)	Mixed (n = 142)	Postmodern (n = 129)	Integrative (n = 59)	Total (n = 527)	
Chosen as one of three political priorities							
−Economy, employment	38%$_a$	66%$_b$	34%$_a$	51%$_{a, b}$	42%$_a$	47%	Chi2 = 30.7, p < 0.001
−Education	20%$_a$	45%$_b$	24%$_a$	37%$_{a, b}$	25%$_{a, b}$	31%	Chi2 = 21.0, p < 0.001
−Environment, climate change	18%$_a$	13%$_a$	10%$_a$	38%$_b$	52%$_b$	18%	Chi2 = 66.5, p < 0.001
−Traditional values	52%$_a$	10%$_b$	25%$_c$	5%$_b$	15%$_{b, c}$	20%	Chi2 = 79.6, p < 0.001
−Animal rights	1%$_a$	11%$_{a, b}$	9%$_{a, b}$	12%$_b$	24%$_b$	11%	Chi2 = 18.6, p < 0.01
Mean number of meat days (per week)	4.8$_{a, b}$	5.3$_b$	5.0$_{a, b}$	4.5$_a$	3.6$_c$	4.7	F = 9.9, p < 0.001
Mean rating personal importance of climate change (z-score)	0.13$_a$	−0.30$_{b,c}$	−0.10$_{b,c}$	0.12$_{a,b}$	0.41$_a$	0.00	F = 6.7, p < 0.001
Mean willingness to save energy (z-score)	0.02$_a$	−0.38$_b$	−0.20$_{a, b}$	0.26$_{a, c}$	0.62$_c$	0.00	F = 14.7, p < 0.001

Note: Each subscript letter denotes a subset of clusters whose means or column proportions do not differ significantly from each other (Bonferroni, p < 0.05). The test results are affected by the size of the clusters.

saving lifestyle changes, and the integratives, who had a low number of meat days and a high level of willingness to make energy saving lifestyle changes. In the USA sample the main difference was that between the traditionals or the mixed (low level of willingness to make energy saving lifestyle changes), on the one hand, and the postmoderns or the integratives, on the other (high level).

4. Discussion

In this section we provide a concise summary of the main results, after which we will reflect on the meaning of these results in terms of our understanding of worldviews, as well as on the methodological shortcomings of our approach. We conclude with offering some suggestions for future research.

One of the main results of this study is that the four hypothesized worldviews – the traditional, modern, postmodern, and integrative worldview – were recognizable in the data with a reasonable degree of reliability, especially in the Dutch sample (with alpha's ranging from 0.88 to 0.53), and to a somewhat lesser extent in the US sample (with alpha's ranging from 0.80 to 0.39). If we consider the breadth of topics included in these worldviews – from views on nature to ideas about death and suffering, from personal values to ideas about science – these alpha's are arguably a satisfying outcome, suggestive of the general construct validity of the IWF. Moreover, the significance of these results is strengthened by the finding of fairly consistent relationships between the worldview clusters and a range of opinions, political priorities, and environmental behaviors, in both samples.

That is, we found significantly more concern about climate change and more political support for addressing it, as well as more sustainable behaviors, among postmoderns and integratives, compared with moderns and traditionals. For example, post-moderns and integratives reported to consume significantly less meat in the Dutch sample and showed significantly more willingness to save energy in both samples. In the Dutch sample, particularly the integratives scored high on the different environmental measures: more than half of them choose 'environment,

climate change, and sustainability' as one of their three top political priorities, they had the lowest mean number of meat days per week, the highest rating of personal importance of climate change, and the highest willingness to save energy.[3] Thus, both in terms of the need for public support for policy changes, as well as for changes in individual behaviors, these two worldviews seem to be key. However, in both countries there are more traditionals and moderns combined (37% in the Netherlands, 42% in the USA) than there are postmoderns and integratives combined (35% in the Netherlands, 31% in the USA), potentially explaining why there currently is insufficient support for far-reaching action on climate change. Concluding, we argue that the study has succeeded in advancing our aim of developing a comprehensive worldviews-scale, able to quantitatively distinguish between these four major, theorized worldviews, and illuminate their interface with the issue of climate change. Of course, this worldview-scale can be further improved in future research, which we will discuss below.

Interestingly, in both samples the traditional worldview was (statistically) most reliable and the postmodern least reliable. Conceptually that makes sense, as the traditional worldview is fairly clear and predefined, as it tends to subscribe to a set of beliefs generally prescribed by traditional authorities, in which individual reflection and critical thinking are frequently discouraged. In contrast, the postmodern worldview is more ambiguous, complex, and fragmented in its nature, often rejecting imposed belief-structures altogether and replacing them with highly individuated, varied, and idiosyncratic constructions of meaning. Think of Lyotard's (1984) definition of postmodernism as 'incredulity towards metanarratives.' Some authors also speak of a tendency towards an increasing "internalization of authority" (Inglehart and Welzel, 2005). Furthermore, historically speaking the traditional worldview is the oldest and therefore probably more consolidated and sedimented (perhaps due to long-term structuration and institutionalization processes), while the newer worldviews, having more recently emerged, tend to have a more differential, dynamic expression (Esbjörn-Hargens and Wilber, 2006).

In the Dutch sample, the postmodern worldview had the highest mean (3.59), and thus was scored the highest, while the

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[3] This is a notable finding that should be explored further, especially since several scholars have made the argument that this worldview may be particularly important in addressing our environmental challenges (e.g., Brown, 2012a,b; De Witt, 2015; Esbjörn-Hargens and Zimmerman, 2009; Hedlund-de Witt, 2014a; Van Egmond and De Vries, 2011).

Table 8
Differences between the clusters for the criterion variables, USA sample.

	Traditional (n = 154)	Modern (n = 78)	Mixed (n = 157)	Postmodern (n = 64)	Integrative (n = 103)	Total (n = 556)	
Chosen as one of three political priorities							
—Economy, employment	54%$_{a, b}$	59%$_{a, b}$	51%$_b$	48%$_{a, b}$	70%$_a$	56%	Chi2 = 11.4, p < 0.05
—Education	22%$_a$	40%$_{a, b}$	26%$_{a, b}$	42%$_b$	39%$_b$	31%	Chi2 = 16.8, p < 0.01
—Environment, climate change	9%$_a$	24%$_{b, c}$	18%$_{a, c}$	45%$_b$	33%$_b$	22%	Chi2 = 43.7, p < 0.001
—Traditional values	27%$_a$	6%$_b$	13%$_b$	6%$_b$	16%$_{a, b}$	16%	Chi2 = 24.1, p < 0.001
—Animal rights	9%$_a$	13%$_a$	11%$_a$	14%$_a$	10%$_a$	11%	Chi2 = 1.7, p > 0.05
Mean number of meat days (per week)	5.0$_a$	5.0$_a$	4.6$_a$	4.6$_a$	4.5$_a$	4.7	F = 1.6, p > 0.05
Mean rating personal importance of climate change (z-score)	−0.21$_a$	−0.02$_{a, b}$	−0.03$_{a, b}$	0.19$_{a,b}$	0.25$_b$	0.00	F = 3.6, p < 0.01
Mean willingness to save energy (z-score)	−0.10$_a$	0.02$_{a, b}$	−0.22$_a$	0.25$_{a,b}$	0.33$_b$	0.00	F = 6.4, p < 0.001

Note: Each subscript letter denotes a subset of clusters whose means or column proportions do not differ significantly from each other (Bonferroni, p < 0.05). The test results are affected by the size of the clusters.

traditional worldview had the lowest mean (−4.13), and thus was scored the lowest. This is not surprising in a non-traditional, post-secular, progressive, and egalitarian country like the Netherlands (see e.g., Hofstede, 1984; Inglehart, 2008; Inglehart and Welzel, 2005). This finding may also contribute to explaining why the postmodern worldview had the lowest reliability, as this world-view in general finds much responsiveness in the Netherlands, therefore making it less distinctive. That is, the items representing this worldview may reflect opinions that many people tend to agree with – even if they do not reflect their deeper worldview-commitments – because they are part of the cultural norm and conventional standard.[4]

The mean scores of the four worldview-scales were substantially different in the American sample, where the traditional worldview scored much higher than in the Netherlands (−0.26), and the modern worldview scored lower (−2.04). Also this finding is not surprising as the influence of traditionalism and traditional religion in the USA is widely reported to be much stronger than in most other Western societies (Aldridge, 2002; Inglehart and Welzel, 2005). However, also in the USA the postmodern worldview is the "most popular one," that is, gets scored the highest on average (1.25), even though still substantially lower than in the Netherlands.

The mean of the integrative scale in the USA was quite high (1.06), which we also see in an unexpectedly large cluster size (19%, compared with 11% in the Netherlands) of the integrative cluster. However, this may be ascribed to methodological shortcomings of the particular formulation of the items of this worldview-scale. That is, the American 'integratives' may in fact be a mix of integratives, traditionals, and particularly postmoderns, the scale thus being unable to adequately distinguish between these groups. This seems likely as the integrative scale was not that strong in the USA (alpha of 0.45), and the integrative cluster did not score much higher on the integrative scale than on the postmodern one. This less distinctive nature of the American integrative cluster compared with the Dutch one may be partially explained by historical-cultural differences between the two countries. For example, in a relatively more religious country like the USA terms as "spiritual" and "Spirit" are likely to have a much broader appeal among different worldview-groups, as they are part of a common

culture, rhetoric, and narrative. In contrast, in a secularized country like the Netherlands such terminology is able to speak more precisely to a particular worldview-group (i.e., an integrative one). That is, whereas traditionals and postmoderns in the USA may also tend to identify with such terminology, in the Netherlands it tends to be associated with a rather specific post-secular, spiritual subculture that traditionalists and post-moderns are less likely to identify with, and may even have aversion to.

In addition, we found, in both samples, a substantial 'mixed' cluster, consisting of individuals that could not be classified into one of the four worldviews. These 'mixed' individuals may not be as consistent in their thinking about life, the world, nature, and society, and therefore not easy to classify in one of the worldviews. They may also be generally less self-reflexive, and therefore less aware of, and thus less able to adequately articulate, their worldview-assumptions. Alternatively, it is possible that they may subscribe to an entirely different worldview-structure that we have not adequately probed for. This raises questions for further research, such as about how to include non-theorized worldviews. Simultaneously, results out of step with the parsimonious categories of predefined worldview-structures are to be expected, especially when quantitatively measured, as these worldviews are of an ideal-typical nature, referring to 'pure types' that as such are not expected to exist in social reality.

A close inspection of the different worldviews, their mean scores, and the relative sizes of the different clusters, reveals the sensitivity of the exact languaging of the different worldview-items. This raises a larger methodological concern. That is, even if we are able to develop a worldview-instrument that is cross-cultural to a certain degree, more work is needed to calibrate the precise language used in different countries. This is due to the fact that the same words (or signifiers) and their standard translations often have very different meanings (or referents) in different cultural milieus. Thus, in future studies pilot research will need to be conducted in order to calibrate the language and framing of the items so as to achieve a high degree of "referential overlap" (Bhaskar, 1979/[Bhaskar, 1979]2015). This point of attention is underscored by the substantial difference in the reliability scores between the two samples, which may be explained in part by the fact that a pre-test was done in the Netherlands. This allowed us to refine our language and reformulate the statements in direct response to the answers of the Dutch participants, while this calibration procedure was omitted in the USA.

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[4] The dominant worldview in a given time and place will likely function as the norm or conventional standard, resulting in other worldview-structures potentially adopting surface features of this dominant worldview.

Another limitation is the sample size. Although sample sizes of 500 are acceptable for the statistical analyses reported here (Hogarty et al., 2005), broader hypothesis testing requires a larger sample size.

5. Conclusion

In this study, we endeavored to advance the development of an empirical measure of worldviews and their ecological implications, using the theoretical *Integrative Worldview Framework* (IWF). While there are several avenues for improvement in future research, including pilot research aimed at culturally sensitive language-testing and refinement, the results show that we have taken an important step toward the development of a valid, reliable worldview-instrument. The IWF's four worldviews were found in the data with a reasonable degree of reliability, especially in the Dutch sample, as were consistent relationships between these worldview-clusters and a range of opinions, political priorities, and behaviors. In both countries postmoderns and integratives displayed substantially more concern about climate change and more sustainable behaviors, compared with moderns and traditionals.

The implications of the development of this (relatively simple and easy-to-use) worldview tool for social science at large are marked, as differences in worldviews are a crucial social phenomenon undergirding many key societal debates, including those on global environmental challenges like climate change. Thus, by providing empirical substantiation and validation of these worldviews, we can more precisely understand the clash of perspectives in public debates, including how various tensions and alliances within society (e.g., the so-called 'culture wars') function. Based on such understanding, the conditions for more mutual understanding across worldviews can be created through communications and policies that find common ground and aspire win–win synergies (see De Witt and Hedlund, in press).

Lastly, these findings are also relevant for policy and leadership. The postmodern and integrative worldviews stand out, in both samples, as being more concerned about climate change, and more willing to make, and politically support, changes. This study therefore suggests that these worldview-groups are important allies in addressing climate change. Various strategies may be employed to embolden them in their socio-political agency and ability to influence dominant structures that reinforce unmitigated climate change. Policy-makers and social change agents should therefore pay careful attention to these worldviews, using this knowledge to speak to them, draw support from them, market to them, and help create the conditions for their growth. However, as traditional and modern worldviews are currently supported by larger percentages in both countries, policy-makers and leaders in the field of climate change may simultaneously need to learn to speak in more effective ways to segments of the population that hold worldviews that are inherently less motivated to behave climate-friendly or vote for addressing climate change, as well as develop and support programs and policies that facilitate changes in worldview (see for example Clarke-Habibi, 2005; Nagata, 2004; Schlitz et al., 2010).

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