AN EXISTENTIAL FUNCTION OF DOOMSDAY: THE EFFECTS OF

EXISTENTIAL VULNERABILITY AND APOCALYPTIC BELIEFS ON MEANING

IN LIFE

By

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A thesis submitted to the

Graduate School-Camden

Rutgers, The State University of New Jersey

In partial fulfillment of the requirements

For the degree of Master of Arts

Graduate Program in Psychology

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Camden, New Jersey

May 2019

THESIS ABSTRACT

An Existential Function of Doomsday: The Effects of Existential Vulnerability and

Apocalyptic Beliefs on Meaning in Life

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Building on research that suggests apocalyptic beliefs regulate feelings of anxiety over the thought of one's inevitable death, the purpose of the current research was to test the potential that people, particularly existentially vulnerable people (i.e., individuals who are dissatisfied with the conditions of their lives), derive meaning in life from apocalyptic beliefs. To complete this aim, I conducted an experiment on a sample of Amazon Mechanical Turk (online subject pool) users ($N = 202$). First, I assessed individual differences in existential vulnerability using the crisis of meaning scale and a trait cynicism scale, and then manipulated apocalyptic beliefs. Specifically, participants were either exposed to an article that provided evidence that the end of the world is near or that end of bookstores is near. Finally, state meaning in life and depressive symptoms (a control variable) were assessed. I hypothesized that the apocalypse would increase state meaning among people who scored high but not low in crisis of meaning and cynicism, respectively. However, the results did not support these hypotheses. More research is needed before concluding apocalyptic beliefs can serve as a source for meaning for those high, not low, in existential vulnerability.

Introduction

According to a recent poll, every 1 out of 5 Americans believes the world will end in their lifetime (Weaver, 2012). With predictions of catastrophic events detailing the demise of humanity occurring nearly every year, the most recent being September 23, 2017 when the media extensively covered a prediction that an unknown planet would collide with Earth ("Beyond 2012", 2017), it is no surprise that the apocalypse is ever present on the American consciousness. So why are so many people drawn to apocalyptic beliefs? I propose that apocalyptic beliefs serve an existential function, supporting peoples' sense that their personal existence is meaningful. In particular, I will argue that existentially vulnerable individuals (i.e., people who lack a secure sense of meaning in life or are otherwise dissatisfied with the conditions of their life) should be most apt to derive meaning from apocalyptic beliefs. To begin, I will define and discuss the importance of meaning in life and draw on existing theory and research to provide rationale for the proposition that apocalyptic beliefs support perceptions of meaning in life. Then, I will draw on existing research to shed light on conditions under which apocalyptic beliefs lead to meaning.

Meaning in Life

Meaning in life describes an individual's sense that their life is purposeful, significant, and coherent (King, Heintzelman, & Ward, 2016). A number of theoretical perspectives have argued that meaning in life is a fundamental psychological need (e.g., Frankl, 1959; Yalom, 1980; Ryff & Singer, 1998), and an important component of psychological health and well-being (Ryff & Singer, 1998; Park, 2010). Indeed, research on meaning in life has evidenced that it is correlated with many aspects of psychological

health. For example, having higher meaning in life is associated with happiness (Debats, Van der Lubbe, & Wezeman, 1993), work satisfaction (Bonebright, Clay, & Ankenmann, 2000), and life satisfaction (Chamberlain & Zika, 1988). Meaning in life is correlated with physical health as well (Steger, Mann, Michels, & Cooper, 2009). Moreover, maintaining a sense of meaning in life is vital component of adjusting to psychological threat (Park 2011; Routledge & Juhl, 2010). Most strikingly, a number of studies have evidenced that meaning in life is predictive of a longer life span (e.g., Hill & Turiano, 2014). In contrast, a deficit of meaning in life has been found to be correlated with suicide ideation and drug abuse (Harlow, Newcomb, & Bentler, 1986), a decrease in psychological health (Mascaro & Rosen, 2005), and an increase of anxiety and depression (Debats et al., 1993).

Meaning and End of the World Beliefs

People satisfy the need for meaning by investing in culturally derived beliefs and practices (i.e. religion). These beliefs help people make sense of their existence and day-to-day lives, give them a sense of purpose to strive for, and provide them with an understanding of their personal importance (Abeyta & Routledge, 2018; Greenberg, Pyszczynski, & Solomon, 1986; Park, 2010). Beliefs about the apocalypse or end of the world are universal and have persisted throughout human history in part because they too help people satisfy the need for meaning (Wojcik, 1997).

To begin, many apocalyptic beliefs give people a purpose or goal to work toward. Specifically, secular and religious apocalyptic worldviews emphasize preparing for the end of days. Religious worldviews emphasize spiritual preparation involving atonement for sins and acceptance of religious teachings. In contrast, secular apocalyptic

worldviews involve actions such as "doomsday prepping", preparing for the apocalypse by doing things, such as building an underground bunker, stockpiling food, water, and even weapons (Kelly, 2016; Wojcik, 1997). It is estimated that there is a population of 3 million "doomsday preppers" living in the United States and there was even a TV series by the same name documenting their activities, becoming the highest rated show in the national geographic channel's history (North, 2012). Preparation for an event can be considered a goal. Goals give life purpose and meaning (Emmons, 1986, 2003, 2005; McGregor & Little, 1998), and that pursuit of goals buffers the effect of existential threat (Vess, Rogers, Routledge, & Hicks, 2016). Interestingly, this research suggests that meaning is not necessarily derived from accomplishing a goal; rather the behavioral drive towards the goal is what contributes to meaning (Emmons, 2005). Illustrative of this point, Vess and colleagues (2016) found that a death reminder decreased meaning in life when people were made to think that they were close to accomplishing a goal, but the death reminder did not decrease meaning when people were made to think they were far from accomplishing a goal.

Apocalyptic beliefs may also provide meaning because they are shared by groups of people. Many Christians, for example, believe in the apocalyptic prophecies described in the Book of Revelation, and a famous cult called "the seekers" believed extraterrestrials would instigate the end of the world (Festinger, Riecken, & Schachter, 1967). People derive meaning in life from these faith communities, in part because they offer opportunities to establish meaningful social bonds and generally support a sense of social belonging (Krause, 2007; Lambert et al., 2013).

In addition to inspiring goals and giving people opportunities for social belonging,

apocalyptic beliefs may generally contribute to meaning in life by giving people the sense that their existence is significant and purposeful through several pathways explained in this section. One such pathway is the Life Story Model of Identity (McAdams, 2001), which suggests that people come to understand their life's meaning by viewing their lives as a story having a beginning, middle, and end. Similarly, understanding human existence and the natural world as being part of a purposeful narrative (e.g., being created in the image of God) is one-way religion and religious-like beliefs contribute to meaning in life (Davis, Juhl, & Routledge, 2011; Pargament, 2001; Park, Edmonson, & Hale-Smith, 2013; Routledge, Abeyta, & Roylance, 2018). Apocalyptic worldviews support these teleological beliefs of human existence, because the end of the world is seen as a purposeful part of some grand cosmic drama. In modern religious apocalyptic narratives rooted in the Abrahamic Traditions, for example, God is believed to bring about the end of times based on his plan for humanity (Gross & Giles, 2012). Moreover, "UFO" apocalyptic worldviews involve belief in a narrative that intelligent extraterrestrial aliens have guided human history, closely monitor human progress, and have a plan for the destruction of Earth (Wojcik, 1997). Of course many apocalyptic narratives consider the apocalypse as the end of life on Earth or the end of civilization, but not the end of existence. For example, many religious apocalyptic narratives tell of the apocalypse ushering in a more ideal spiritual existence (Gross & Giles, 2012), whereas secular apocalyptic narratives tell of a post-apocalyptic existence either on earth where social structure has collapsed or on some other planet (Wojcik, 1997). Research indicates that the promise of an afterlife is one reason why people embrace apocalyptic beliefs (Lifshin, Greenberg, Weise, & Soenke, 2016). According to terror management theory (TMT;

Greenberg, Pyszczynski, & Solomon, 1986), people derive meaning and a sense of permanence from believing in the existence of an afterlife. In support of this point, promoting the belief in a spiritual afterlife was found to mitigate the effects of existential threat even among atheists (Heflick, & Goldenberg, 2012).

Finally, apocalyptic beliefs are fatalistic, thus they provide people with a sense of certainty or predictability (Wojcik, 2011). A number of studies suggest that living in a world that is ordered and predictable contributes to perceptions of meaning in life. For example, presenting people with stimuli that reinforce the idea the world is ordered and predictable has been found to increase perceptions of meaning (Heintzelman, Trent, & King, 2013) and purpose in life (Kay, Laurin, Fitzsimons, & Landau, 2014). Cultural belief systems help people to make sense of life events and research indicates the ability to do so is a vital component for adaptive stress management (Park & Folkman, 1997). Moreover, the meaning maintenance model (MMM; Heine, Proulx, & Vohs, 2006) proposes that meaning is maintained by coherence of the external world and that people respond to stimuli that violate coherence by investing in cultural beliefs that restore certainty and predictability. This process is referred to as fluid compensation. Support for fluid compensation comes from studies demonstrating that subtle exposure to stimuli that violate peoples' expectations, leads them to affirm important cultural beliefs and identities. For example, Proulx, Heine, and Vohs (2010) found that participants who read an absurdist story that ended in a very unexpected way, compared to a familiar parable, reported a stronger sense of cultural identity. In sum, apocalyptic worldviews may help restore a sense of predictability when the world otherwise feels senseless.

When Apocalyptic Beliefs Provide Meaning

        Even though there are a number of reasons why apocalyptic beliefs can contribute to meaning in life, they are often viewed as fringe or extremist beliefs (Wojcik, 1997) and therefore may only serve an existential function under certain circumstances. For example, even though apocalyptic narratives are a major component of Christian religious belief, a study by Routledge, Abeyta, and Roylance (2018) provided evidence that apocalyptic beliefs serve an existential function only among Christians high in religious fundamentalism. Religious fundamentalism is defined as an extreme religious stance characterized by a dogmatic approach to religious doctrine, a literal interpretation of the Bible and/or religious texts, and the belief that their religious worldview is the only valid and true religion (Altemeyer & Hunsberger, 1992). Drawing on insights from TMT (Greenberg, Pyszczynski, & Solomon, 1986), which suggests that people cope with the realization that death is inevitable by investing in meaning providing worldviews, Routledge and colleagues (2018) found that a mortality reminder, relative to a pain reminder, increased apocalyptic beliefs. However, this effect was only found among those high, but not low in religious fundamentalism.

        Commitment to an apocalyptic narrative means embracing the destruction of worldly sources of meaning in life. People who have meaning in life or who are otherwise satisfied with the conditions of their life should simply not have to resort to such an extreme fatalistic source of meaning and if anything might resist it. Many people derive meaning from membership in cultural groups and striving to create a lasting cultural legacy (Castano, Yzerbyt & Paladino, 2004), and research indicates that threats to meaning in life motivate people to defend important cultural identities and affirm

meaningful cultural experiences/contributions (Burke, Martens, & Faucher, 2010; Routledge et al., 2011). Recent research indicates that people who are invested in their cultural legacy are less motivated to believe in information suggesting the end of the world is near (Lifshin et al., 2016). Thus, apocalyptic beliefs might not be an attractive source of meaning for people with a strong sense of meaning in life.

In contrast, those who do not have secure meaning or who are otherwise dissatisfied with the conditions of their lives might resort to apocalyptic beliefs to satisfy the need for meaning in life. In support of this potential, Hayes, Ward, and McGregor (2016) provided evidence that people who are dissatisfied with and/or see little value in their lives respond to existential threat by fatalistically withdrawing from life. Specifically, Hayes and colleagues found that existential threat decreased the desire for life among people who expressed low life satisfaction, and among those who lack a sense of self-worth, relative to those who expressed high life satisfaction and those with a strong sense of self-worth. Moreover, Hayes and colleagues found that existential threat motivated a pessimistic and fatalistic view of the world among people low, but not high, in satisfaction with life. Taken together, Hayes and colleagues research indicates that existentially vulnerable individuals are inclined to further distance themselves from conventional worldly sources of meaning, such as culture and interpersonal relationships, and instead embrace inevitable death and destruction. Of course apocalyptic worldviews center on death and destruction that will bring on the inevitable end of worldly meaning, so this research suggests that existentially vulnerable types might embrace apocalyptic worldviews when confronting existential threat. Indeed, a study by Abeyta and Routledge (2018) provided direct evidence supporting this potential. Specifically, the researchers

assessed peoples' perceptions of the presence of meaning in their life, and then exposed

them to a meaning bolster or a meaning threat condition. In the meaning bolster

condition, research participants wrote about an experience that strengthened the sense

that their life is meaningful, whereas in the meaning threat condition research participants

wrote about an experience that weakened their sense that their life is meaningful. After

the writing task, the participants read an editorial ostensibly taken from a news website

that put forth the argument that experts believe that the end of the world is coming soon

and then responded to statements on the extent to which they were open to believing the

argument that the end is near. Meaning threat, relative to meaning bolster, increased

openness to the belief that the end is near among individuals who expressed a lower sense

presence of meaning, but did not affect end of the world beliefs among people who

expressed a high presence of meaning. Thus, meaning threat inspired apocalyptic beliefs

but only among existentially vulnerable people (i.e., people with meaning in life deficits).

The purpose of the current study was to build on Abeyta and Routledge's (2018)

finding by testing whether apocalyptic beliefs promote meaning in life, particularly

among existentially vulnerable individuals. Inspired by past research (e.g., Hayes et al.,

2016), I have broadly defined existential vulnerability as a general sense that life is

meaningless and/or dissatisfying, and therefore chose individual difference measures that

capture this general sense. Specifically, I used the crisis of meaning scale (SoMe, Schnell

& Becker, 2007; Schnell, 2009) and a trait cynicism scale (Butcher et al., 1989). The

crisis of meaning scale is meant to assess frustration from the lack of meaning in life and

has been found to be inversely associated with happiness and life satisfaction (e.g.,

Schnell, 2009). The trait cynicism scale is meant to assess a general pessimistic and

untrusting view of the world and humanity. Research indicates that cynicism is predictive of emotional distress, feelings of hopelessness, motivational deficits, depression, and deficits in meaning in life (Clark, 1994; for a review see, Smith, Weisenbach, & Jones, 2018). After assessing crisis of meaning and cynicism, I manipulated apocalyptic beliefs by having participants read a narrative suggesting that the end is near, and measure perceptions of meaning in life. Finally, I assessed depression to control for it as a third variable. I hypothesized that presenting people with information suggesting that the end of the world is drawing near will result in an increase to levels of meaning in life among those high, not low, in existential vulnerability.

Method

Participants

The desired sample size was determined using Soper's (2018) a-priori sample size calculator. Based on previous research (e.g., Abeyta & Routledge, 2018), a small to medium effect size ($f^2 = .08$) was anticipated. Based on the design, this effect size, power of .80, and alpha set at .05, the required minimum sample size was 139. However, I had planned to recruit at least 200 participants to ensure the study was adequately powered.

Participants consisted of 202 Amazon Mechanical Turk (Mturk) workers residing in the United States (89 females). Participants' ages ranged from 19 to 68 years ($M = 36.80$, $SD = 10.96$) with 77% being Caucasian, 8% African American, 8% Asian, and 7% other. In addition, the sample largely consisted of Christians ($n = 83$) as well as 77 Atheists, 30 Agnostics, 6 Judaists, and 6 other. Participants were compensated $1 for completing a 10 min survey.

Procedure

This study was a cross-sectional between subjects experimental design. The study was an online questionnaire open to Mturk participants residing in the United States. After completing informed consent, the participants proceeded to the beginning of the survey. The participants completed two individual difference measures meant to assess existential vulnerability: crisis of meaning and cynicism. Then, participants were randomly assigned to read either an apocalyptic narrative (experimental condition) or a bookstore closing narrative (control condition). After reading the narrative, the participants completed a state meaning in life questionnaire. To control for depression, participants completed a depression subscale. Finally, controlling for demographic variables such as gender, participants completed a brief demographics survey and were

presented with a written debriefing statement. The entire survey took approximately 10 min.

Materials

Crisis of meaning. Crisis of meaning was assessed using the Crisis of meaning subscale of the Sources of Meaning and Meaning in Life Questionnaire (SoMe, Schnell & Becker, 2007; Schnell, 2009). The crisis of meaning subscale consists of 5-items. Each item has a Likert-like 6-point response (1 = *totally disagree* to 6 = *totally agree*). It includes items such as, "I feel pain from finding no purpose in my life". Scoring higher on the scale indicated a greater crisis of meaning. Responses to the scale formed a reliable index and were therefore averaged to create Crisis of Meaning scores (α = .95; M = 2.47, SD = 1.28).

Cynicism. Cynicism was assessed using the cynicism content scale of the MMPI-2 (Butcher et al., 1989). The cynicism content scale consists of 23 items. Each item uses a 6-point Likert-like response scale (1 = *strongly disagree* to 6 = *strongly agree*). It includes items such as "I have often met people who were supposed to be experts who were no better than I". Scoring higher on the scale indicated a greater level of cynicism. Responses to the scale formed a reliable index and were therefore averaged to create Cynicism scores (α = .93; M = 3.27, SD = 0.80).

Experimental manipulation. As previously mentioned, participants were randomly assigned to read either an apocalyptic narrative (experimental condition) or a bookstore closing narrative (control condition). Participants in both conditions were instructed to read a narrative about current global events and informed that they will need to read the narrative carefully and keep it mind because they will have to respond to

questions about the narrative later in the study. In the apocalypse condition, the

participants read an essay arguing that experts believe that the end of the world is closer

than ever due to recent global events (e.g., natural disasters, disease outbreak, rising

tensions over nuclear armament; see Appendix #). The apocalypse narrative was modeled

after a similar narrative created by Routledge and colleagues (2018). In the bookstore

narrative condition, participants read an essay arguing that experts believe that the end of

bookstores is closer than ever due to recent global events (e.g., prevalence of online

booksellers, popularity of tablets/e-readers etc.; see Appendix #). Both essays are similar

in length, style, complexity, and both argue that the end of something is coming soon.

Meaning in life. The dependent variable is meaning in life, which was assessed

using a state version of the presence of meaning subscale of the Meaning in Life

Questionnaire (MLQ; Steger, Frazier, Oishi, & Kaler, 2006). This is a 5-item measure

that uses a 7-point Likert-like response scale (1 = *absolutely untrue* to 7 = *absolutely*

true). It includes items such as "I have a good sense of what makes my life meaningful".

Scoring higher on the scale indicated a greater meaning in life. Responses to the scale

formed a reliable index and were therefore averaged to create meaning in life scores (α =

.95; M = 4.85, SD = 1.63).

Depression. Depression, a control variable, was assessed using the SCL-CD6

Depression Subscale of the Symptom Checklist-90 (Bech, 2016). This is a 6-item

measure that uses a 5-point Likert-like response scale (0 = *not at all* to 4 = *extremely*). It

includes items such as "How much have you been bothered by: Feeling no interest in

things". Scoring higher on the scale indicated a greater level of depression. Responses to

the scale formed a reliable index and were therefore averaged to create depression scores

(α = .94; M = 2.33, SD = 1.08).

Manipulation Check

After the completion of the study, a manipulation check was included to measure

the strength of the experimental condition. This check was a 3-item measure that used a

6-point likert-like response scale (1 = *strongly disagree* to 7 = *strongly agree*). It included

items such as "Thinking about the article I read earlier makes me think that the end of the

world is coming soon." (α = .95; M = 2.26, SD = 1.43). Demographic questions were

included at the end of the survey to collect age, gender, ethnicity, religion, religiosity,

education, and political ideology.

Results

Manipulation Check

An independent-samples t-test was conducted to compare scores on the manipulation check in the apocalypse and bookstore conditions. This test revealed that those in the apocalypse condition reported stronger agreement to the article that suggests that the end of the world is near ($M = 2.77, SD = 1.44$) than those in the bookstore condition ($M = 1.76, SD = 1.24$), $t(200) = 5.31, p < .001$.

The Effects of Apocalypse Manipulation by Crisis of Meaning

I conducted a hierarchal linear regression analysis. In the first step of this analysis I tested the unique effects of the apocalypse manipulation (dummy coded) and crisis of meaning (centered) on meaning in life. In the second step I added the control variables of gender (dummy coded) and depression (centered). Finally, in the third step I added the apocalypse x crisis of meaning interaction term.

The model in the first step was statistically significant, $R^2 = .68, F(2, 199) = 217.89, p < .001$. The effect the apocalypse manipulation on meaning in life was not statistically significant, $b = .06, SE = .13, t = .46, p = .65, sr^2 < .001, 95\%$ CI [-0.20, 0.31]. However, the association between crisis of meaning and lower levels of meaning in life was statistically significant, $b = -1.05, SE = .05, t = -20.86, p < .001, sr^2 = .69, 95\%$ CI [-1.15, -0.95]. Adding the control variables, gender and depression, to the model in the second step did not significantly increase the variance in meaning in life scores explained by the model, $\Delta R^2 = .002, F(2, 197) = 0.66, p = .52$. Specifically, depression was not significantly associated with meaning, $b = 0.04, SE = .09, t = 0.39, p = .70, sr^2 < .001, 95\%$ CI [-0.14, 0.21], and the gender difference on meaning in life was not statistically

significant, $b = 0.15$, $SE = .13$, $t = 1.13$, $p = .26$, $sr^2 = .002$, 95% CI [-0.11, 0.41]. The

effect of the apocalypse manipulation on meaning in life remained non-significant, $b =$

0.05, $SE = .13$, $t = 0.36$, $p = .72$, $sr^2 < .001$, 95% CI [-0.21, 0.30]. The association

between crisis of meaning and lower levels of meaning in life, $b = -1.08$, $SE = .07$, $t = -$

14.47, $p < .001$, $sr^2 = .33$, 95% CI [-1.22, -0.93], remained statistically significant.

Finally, adding the apocalypse x crisis of meaning interaction term in the third step did

not significantly increase the variance in meaning in life scores explained by the model,

$\Delta R^2 = .001$, $F(1, 196) = 0.68$, $p = .41$. Indeed, the predicted interaction between the

apocalypse manipulation and crisis of meaning on meaning in life was not statistically

significant, $b = .08$, $SE = .10$, $t = .82$, $p = .41$, $sr^2 = .001$, 95% CI [-0.12, -0.28].

Even though the interaction did not reach statistical significance, I conducted

predicted means tests (Aiken & West, 1991), to examine the effect of the apocalypse

condition at high levels of crisis of meaning (+1 SD above the mean) and low levels of

crisis of meaning (-1 SD below the mean) for exploratory purposes. At low crisis of

meaning, there was a non-significant trend such that the apocalypse condition, relative to

the bookstore condition, decreased meaning in life, $b = -0.60$, $SE = 0.18$, $t = -0.33$, $p =$

.74, 95% CI[-0.42, 0.30]. In contrast, at high crisis of meaning there was a non-

significant trend such that the apocalypse condition, relative to the bookstore condition,

increased meaning, $b = 0.15$, $SE = 0.18$, $t = 0.93$, $p = .41$, 95% CI[-0.21, 0.52]. The effect

of apocalypse on meaning in life at high and low levels of crisis of meaning is plotted in

Figure 1.

The Effects of Apocalypse Manipulation by Cynicism

I conducted a hierarchal linear regression analysis. In the first step of this analysis I tested the unique effects of the apocalypse manipulation (dummy coded) and cynicism (centered) on meaning in life. In the second step I added the control variables of gender (dummy coded) and depression (centered). Finally, in the third step I added the apocalypse x cynicism interaction term.

The model in the first step was statistically significant, $R^2 = .09$, $F(2, 199) = 10.36$, $p < .001$. The effect the apocalypse manipulation on meaning in life was not statistically significant, $b = .11$, $SE = .22$, $t = .50$, $p = .62$, $sr^2 = .001$, 95% CI [-0.32, 0.54]. However, the association between cynicism and lower levels of meaning in life was statistically significant, $b = -0.62$, $SE = .14$, $t = -4.53$, $p < .001$, $sr^2 = .09$, 95% CI [-0.89, -0.35]. Adding the control variables, gender and depression, to the model in the second step did significantly increase the variance in meaning in life scores explained by the model, $\Delta R^2 = .36$, $F(2, 197) = 40.42$, $p < .001$. Specifically, depression was significantly associated with meaning, $b = -0.92$, $SE = .10$, $t = -8.99$, $p < .001$, $sr^2 = .26$, 95% CI [-1.13, -0.72], and the gender difference on meaning in life was not statistically significant, $b = -0.18$, $SE = .19$, $t = -.95$, $p = .35$, $sr^2 = .003$, 95% CI [-0.55, 0.19]. The effect of the apocalypse manipulation on meaning in life remained non-significant, $b = 0.08$, $SE = .19$, $t = 0.41$, $p = .69$, $sr^2 < .001$, 95% CI [-0.29, 0.44]. The association between cynicism and lower levels of meaning in life, $b = 0.04$, $SE = .14$, $t = .31$, $p = .76$, $sr^2 < .001$, 95% CI [-0.23, 0.32], became no longer statistically significant. Finally, adding the apocalypse x crisis of meaning interaction term in the third step did not significantly increase the variance in meaning in life scores explained by the model, $\Delta R^2 = .36$, $F(1, 196) = 0.13$, $p = .72$. Indeed, the predicted interaction between the apocalypse

manipulation and cynicism on meaning in life was not statistically significant, $b = -0.09$,

$SE = .24, t = -.36, p = .72, sr^2 < .001$, 95% CI [-0.55, 0.38].

Even though the interaction did not reach statistical significance, I conducted

predicted means tests (Aiken & West, 1991), to examine the effect of the apocalypse

condition at high levels of cynicism (+1 SD above the mean) and low levels of cynicism

(-1 SD below the mean) for exploratory purposes. At low cynicism, there was a non-

significant trend such that the apocalypse condition, relative to the bookstore condition,

increased meaning in life, $b = -1.43, SE = 0.26, t = -0.54, p = .58$, 95% CI[-0.66, 0.37]. At

high cynicism there was no effect, $b = -0.007, SE = 0.26, t = -0.02, p = .97$, 95% CI[-

0.53, 0.51]. The effect of apocalypse on meaning in life at high and low levels of

cynicism is plotted in *Figure 2*.

Discussion

I hypothesized that signs of an approaching apocalypse would increase meaning, particularly for individuals who scored higher in crisis of meaning and cynicism, respectively. However, I did not find evidence to support my hypotheses. The effect of apocalypse on meaning in life was not statistically significant and was not significantly moderated by individual differences in crisis of meaning or cynicism. It is worth noting that even though the apocalypse by crisis of meaning on state meaning in life interaction effect was not significant, the non-significant trends for the effects of the apocalypse condition on meaning in life at high and low levels of crisis of meaning were in the predicated direction. Specifically, at low crisis of meaning, those in the apocalypse condition, relative to the bookstore condition, tended to score lower in presence of meaning, while at high crisis of meaning those in the apocalypse condition, relative to the bookstore condition, tended to score higher in meaning. The interaction effect for cynicism was not in the predicted direction. At low levels of cynicism, in the apocalypse condition, relative to the bookstore condition, appeared to lead to increases in meaning, whereas the effect at high cynicism was positive but much weaker. In sum, the data provide little support for the notion that people, particularly existentially people, derive meaning from the apocalypse.

These findings are in contrast to Abeyta and Routledge's (2019) findings that people who generally report lower presence of meaning in life, are more open to apocalyptic beliefs when their sense of meaning in life is further threatened. The previous study manipulated meaning and then measured apocalyptic beliefs. Meanwhile, this study manipulated apocalyptic threat and then measured meaning. Threatening meaning may be

a simpler task than threatening an impending apocalyptic event. In a meaning manipulation, the participant has to write about a time they felt that their life was meaningless, this leads the participant to draw upon their own personal experiences, in the apocalypse manipulation, participants read an essay detailing the possibility of a world-ending event, which does not necessarily draw upon personal experiences and so may not be as impactful. It is plausible that simply providing someone with a narrative arguing that the end of the world is near is not enough to convince him or her of such an extreme occurrence, change preexisting apocalyptic beliefs, or evoke the feeling of a true apocalyptic threat. Hypothetically, a more realistic manipulation could yield a greater effect (e.g. staging an apocalyptic news broadcast on television or radio), but the ethical concerns involved in such a manipulation would make it very difficult to accomplish. Finding a way to incorporate a convincing, but ethical, apocalyptic manipulation could be an improvement for future studies.

Limitations

In addition to improving the manipulation we could also find a better way to operationalize existential vulnerability. Crisis of meaning was significantly associated with meaning in life, even when controlling for depression. Meanwhile cynicism was significantly associated with meaning in life, until controlling for depression. This may be due to cynicism and depression having several overlapping features, such as lack of meaning, lack of motivation, and feelings of hopelessness that are related to meaning, yet cynicism includes other features that may not be related to meaning. In support of this, cynicism has been said to have "light" and "dark" forms, whereas "light" is characterized by wittiness, "dark" is characterized by bleakness (Vice, 2011). Cynicism has been found

to be significantly correlated with depressive symptoms (Brummett et al., 2000), and I believe in this instance, depression may be similar to the bleak form of cynicism. The trait cynicism scale measures cynicism generally, which would include both light and dark forms of cynicism, but if only the dark or bleak form of cynicism is what is explaining the relationship with meaning, then depression explains the relationship better as it includes the bleakness of cynicism without the wittiness. This might explain why cynicism is significant until depression is included in the model. In hindsight, cynicism may not have been the best way to operationalize "existential vulnerability". For future research, I'd suggest looking into more precise ways of assessing the construct of existential vulnerability.

Also, the use of an Mturk sample may be a limitation. Mechanical Turk incentivizes participation by paying users per study completed, leading to a division of users who can be considered "professional participants". While this division is a small percentage of users, they complete a large amount of the studies on Mturk (Chandler et al., 2014). It is possible that these Mturk users are not as naïve as the general population as they frequently complete studies through Mturk, and so they may be more likely to understand and anticipate the use of deception in psychological studies through repeated exposure. Users experienced in use of deception in studies are likely to respond differently, compared to participants who aren't experienced with the use of deception (Ortmann & Hertwig, 2002). Studies have found that repeated exposure to the same research paradigm can reduce its validity (e.g.,Chandler et al., 2015; DeVoe & House, 2016). In the current study, deception is used in the manipulation when the experimental condition is provided a narrative, seemingly written by scientists, warning of the

approaching apocalypse. Potentially, the manipulation may have failed to deceive the Mturk users, as they may have experienced similar paradigms implemented in previous studies, leading to invalid responses.

Implications

Although I didn't find any evidence to suggest that apocalyptic beliefs serve an existential function, previous findings have. As discussed in the introduction, past research found evidence suggesting apocalyptic beliefs can serve as a source for meaning in life, particularly for people who lack a sense of meaning in life or are cynical about the conditions of the world. This implies that people who are existentially vulnerable or having severe distress over lack of meaning in life are more likely to endorse fatalistic worldviews as meaning providing sources (e.g. Abeyta & Routledge, 2018). Traditionally, people turn to more positive forms of meaning providing sources, such as family, religion, and their community (Lambert et al., 2013), but if these fatalistic worldviews succeed in providing meaning for existentially vulnerable individuals then it may become more difficult for those individuals to invest in conventional sources of meaning. If an individual no longer needs family or their community to give them meaning, then it may become too difficult to reintegrate them, essentially widening the rift between them and the rest of society. Therefore it is important to identify these individuals and encourage them to embrace more "healthy" worldviews to provide meaning. In light of this, a potential direction for future research could be a longitudinal study, examining the effects of existential vulnerability and the apocalypse on meaning in life among participants that have pre-existing beliefs about the apocalypse, such as doomsday-preppers. As well as testing whether these beliefs get in the way of

conventional sources of meaning and if they are predictive of reduced well-being or other negative health or social outcomes.

Research on the effects of apocalyptic beliefs is limited. From past research, it is believed that apocalyptic beliefs can act as a source for meaning making, particularly among individuals with a deficit of meaning. While, this study failed to support previous findings, results showed a trend in the predicted direction and broadened the possibilities for potential future research. Bearing in mind the pervasiveness of apocalyptic beliefs, society's captivation with doomsday scenarios observed throughout popular media, and the negative outcomes related with subscribing to end-of-the-world doctrines, further investigation is needed into the psychological effects of apocalyptic worldviews.
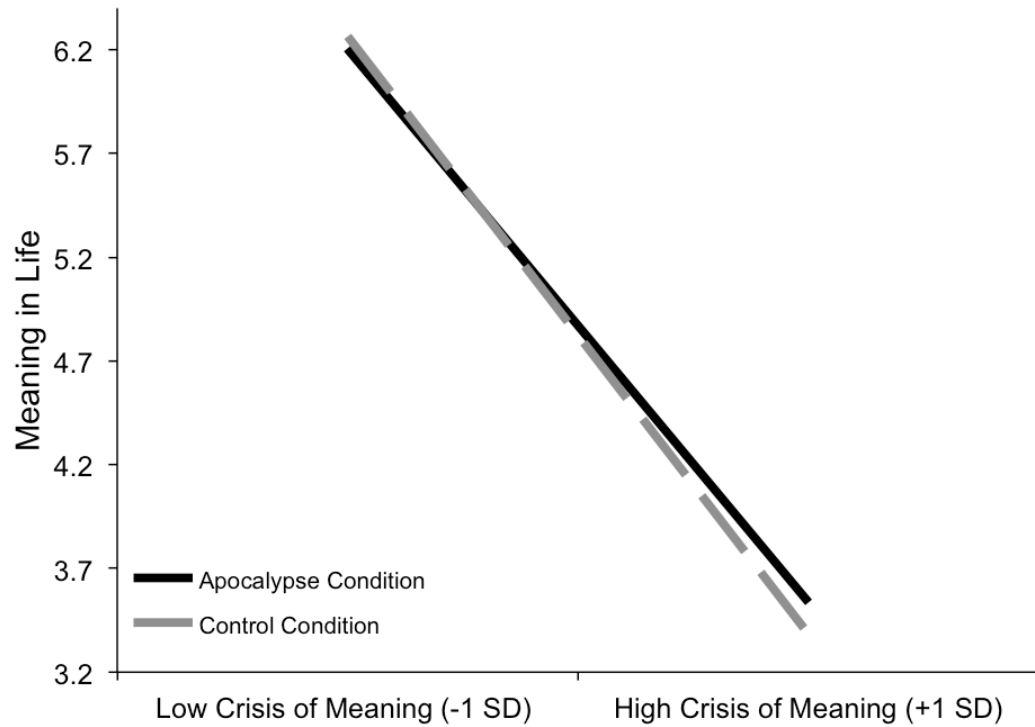
Figure 1. The effect of the apocalypse condition on meaning in life at high levels of crisis

of meaning (1 SD above the mean) and low levels of crisis of meaning (1 SD below the
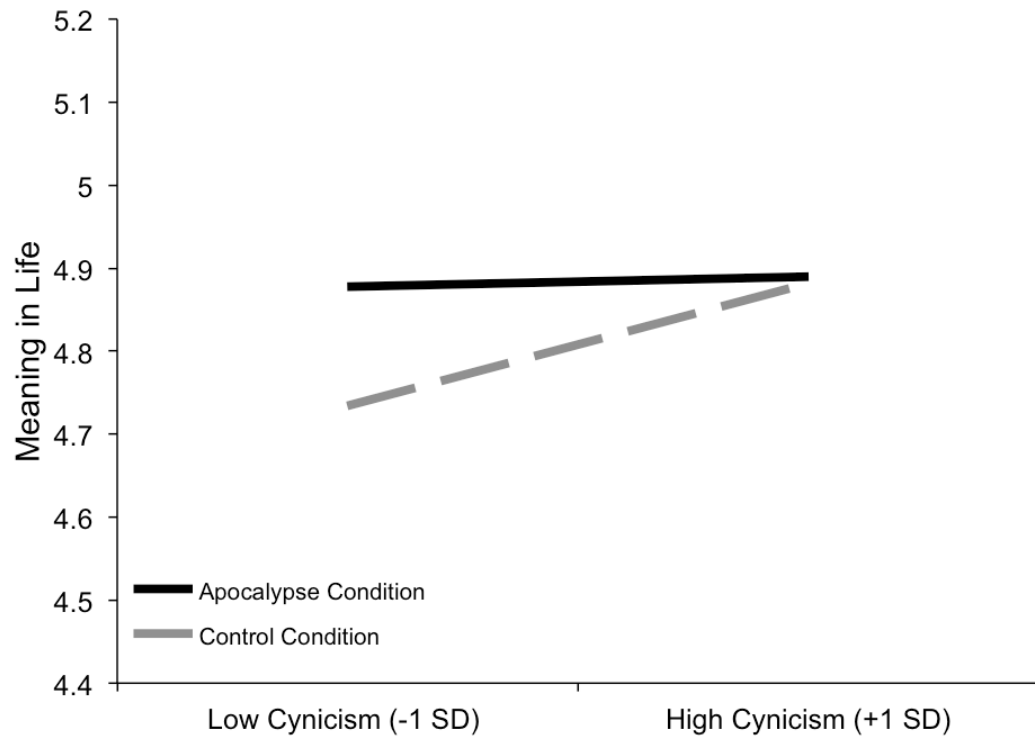
mean)

Figure 2. The effect of the apocalypse condition on meaning in life at high levels of cynicism (1 SD above the mean) and low levels of cynicism (1 SD below the mean).

Appendix

Measures and Materials

[Apocalypse narrative]

In recent years, many people have argued that there are an increasing number of signs suggesting that the world will come to an end soon. For example, in recent years the number of natural disasters taking place each year has increased significantly. From the period of 1970 to 2015 the average number of natural disasters reported each year in the United States went from 78 to a staggering 376. Consider the case of tornadoes; in just the first quarter of 2017 the number of tornadoes observed was twice as high as the average for the last 10 years. In the recent months, there have been some of the strongest hurricanes ever recorded, causing massive flooding, destruction, and loss of life. Scientists expect that the strongest storms on the planet should continue to get stronger. Droughts and heat waves all across the United States have also contributed to significant food shortage and wildfires across the nation. There have already been 82 wildfires in the United States this year, burning more than 8 million acres. This September Mexico experienced earthquakes reaching magnitudes of 8.1, the strongest earthquake in the country's history in over 200 years. Other world ending threats include increased risk of global disease outbreaks and weapons of mass destruction that may be in the lands of terrorist organizations. Moreover, increased tensions among nuclear powers make a destructive world war increasingly likely. Many people of course believe that it is highly unlikely that any of these events would bring about the end of the world, but religious

scholars and scientists agree that the convergence of all these distinct threats is making the possibility of the world ending more likely than ever.

[Bookstore narrative]

In recent years, many people have argued that there are an increasing number of signs suggesting that the traditional brick and mortar book store will come to an end soon. For example, in recent years the number of book purchases made online has significantly increased. Consider the case of paperback books. The period of April 25-28 in 2012 was the largest increase in paperback book purchases made online in United States history. During that time there were at least 10 million paperback books sold on Amazon alone. Since Amazon began selling books in 1994 the number of traditional bookstores that exist in the United States has steadily declined. Similarly, the low prices offered in the online bookstores like Amazon has contributed to the growing number of bookstores that have declared bankruptcy in the last several years. For example, in 2012 there were approximately 10,000 traditional brick and mortar bookstores in the United States. Just ten years before, however, there were closer to 13,000. New digital reading devices such as the Kindle, Nook, and iPad have also contributed to significant decreases in books sold at traditional bookstores across the nation. The risk of a global dramatic decline in traditional bookstores is also currently extremely high as more people around the world are buying books online or downloading ebooks than ever before, which increases the probability that traditional bookstores will go bankrupt across the globe. Other bookstore ending threats include the increased availability, affordability, and popularity of other forms of entertainment such as movies, music, and video games.

Many people of course believe that it is highly unlikely that any of these events would

bring about the end of the traditional bookstore but literary scholars and economists

agree that the convergence of all of these distinct threats is making the possibility of the

extinction of the traditional brick and mortar bookstore more likely than ever.

[meaning in life questionnaire- presence of meaning]
Please respond to the following statements as truthfully and accurately as you can based
on your general feelings.

1	2	3	4	5	6	7
Absolutely Untrue	Mostly Untrue	Somewhat Untrue	Can't Say True or False	Somewhat True	Mostly True	Absolutely True

1. ___ I understand my life's meaning.
2. ___ My life has a clear sense of purpose.
3. ___ I have a good sense of what makes my life meaningful.
4. ___ I have discovered a satisfying life purpose.
5. ___ My life has no clear purpose.

Citation:
Steger, M. F., Frazier, P., Oishi, S., & Kaler, M. (2006). The Meaning in Life
    Questionnaire: Assessing the presence of and search for meaning in life. *Journal
    of Counseling Psychology, 53*, 80-93.

[crisis of meaning]
Indicate the extent to which you agree or disagree with the following statement
            1 = Strongly disagree
            2 = Disagree
            3 = Slightly disagree
            4 = Slightly agree
            5 = Agree
            6 = Strongly agree
1. I feel the pain from finding no purpose in my life.
2. My life seems empty.
3. My life seems meaningless.
4. When I think about the meaning of my life I find only emptiness.
5. I don't see any sense in life.

Citation:

Schnell, T. (2009). The sources of meaning and meaning in life questionnaire (SoMe): Relations to demographics and well-being. *Journal of Positive Psychology, 4,* 483-499.

[Cynicism scale]
Please rate the following statements on how much you agree or disagree with them.
    1 = strongly disagree, 2 = disagree, 3 = moderately disagree, 4 = moderately agree, 5 = agree, 6 = strongly agree

1. I have often had to take orders from someone who did not know as much as I did.

2. I think a great many people exaggerate their misfortunes in order to gain the sympathy of others.

3. It takes a lot of argument to convince most people of the truth.

4. I think most people would lie to get ahead.

5. Most people are honest chiefly because they are afraid of being caught.

6. Most people will use somewhat unfair means to gain profit or an advantage rather than to lose it.

7. I often wonder what hidden reason another person may have for doing something nice for me.

8. My way of doing things is apt to be misunderstood by others.

9. It is safer to trust nobody.

10. Most people make friends because friends are likely to be useful to them.

11. The person who provides temptation by leaving valuable property unprotected is about as much to blame for its theft as the one who steals it.

12. I think nearly anyone would tell a lie to keep out of trouble.

13. Most people inwardly dislike putting themselves out to help other people.

14. I have often met people who were supposed to be experts who were no better than I.

15. I tend to be on my guard with people who are somewhat more friendly than I had expected.

16. People generally demand more respect for their own rights than they are willing to allow for others.

17. I have often found people jealous of my good ideas, just because they had not thought of them first.

18. Most people will use somewhat unfair means to get ahead in life.

19. The future is too uncertain for a person to make serious plans.

20. People have often misunderstood my intentions when I was trying to put them right and be helpful.

21. I have frequently worked under people who seem to have things arranged so that they get credit for good work, but are able to pass off mistakes onto those under them.

22. A large number of people are guilty of bad sexual conduct.

23. Most men are unfaithful to their wives now and then.

Citation: Butcher, J. N., Graham, J. R., Ben-Porath, Y. S., Tellegen, A., Dahlstrom, W. G., & Kaemmer, B. (1989). Minnesota Multiphasic Personality Inventory-2 (MMPI-2).

[SCL-CD6 Subscale of the SCL-90: Depression]

The following lists a number of problems you may sometimes experience. Please read each of them through thoroughly. Then please tick the box that best describes how much you have been bothered by each problem during the past week, including today. Only tick one box for each question. If you change your mind then please carefully erase your first reply. It is essential that you answer all the questions.

> 0= Not at all
> 1= A little
> 2= Some-what
> 3= Quite a lot
> 4= Extremely

How much have you been bothered by:
1. Feeling that everything is an effort
2. Feeling low in energy or slowed down
3. Blaming yourself for things
4. Feeling sad or blue
5. Feeling no interest in things
6. Worrying too much about things

Citation: Bech, P. (2016). Self-reported Symptom State Scales Derived from the SCL-90.

In *Measurement-Based Care in Mental Disorders* (pp. 15-30). Springer, Cham.

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