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Magical Thinking Decreases Across Adulthood

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Magical thinking, or illogical causal reasoning such as superstitions, decreases across childhood, but almost no data speak to whether this developmental trajectory continues across the life span. In four experiments, magical thinking decreased across adulthood. This pattern replicated across two judgment domains and could not be explained by age-related differences in tolerance of ambiguity, domain-specific knowledge, or search for meaning. These data complement and extend findings that experience, accumulated over decades, guides older adults' judgments so that they match, or even exceed, young adults' performance. They also counter participants' expectations, and cultural sayings (e.g., "old wives' tales"), that suggest that older adults are especially superstitious.

Keywords: aging, magical thinking, superstition, judgment

Bad luck comes in threes. Find a penny, pick it up; all day long, you'll have good luck! The term for these sayings, *old wives' tales*, hints at an intuitive and widespread assumption: that older adults hold more superstitious beliefs than young adults do. Indeed, most participants in a qualitative study "agreed that superstitious beliefs were taken more seriously by the older people in their communities" (Edu, 2014, p. 118). But what empirical evidence, if any, points to age-related increases in these beliefs?

Most developmental approaches to *magical thinking*,[1] or causal explanations that contradict the laws of nature, focus on the beginning of the life span (e.g., Rosengren & French, 2013). Violations of physical (e.g., boy turning into a fish), but not social (e.g., boy taking a bath with shoes on), laws appear "magical" to 3- and 4-year-olds (Browne & Woolley, 2004). As children learn about natural laws, these beliefs fade. Phelps and Woolley (1994) asked 4-, 6-, and 8-year-olds to explain surprising events (e.g., two unattached magnetic disks repelling each other without physical contact). Older children provided fewer magical explanations, and the availability of physical explanations (e.g., magnetism) mediated this decline. Moreover, children's ritualistic behavior correlates positively with magical belief, but negatively with the use of concrete, physical explanations (Evans, Milanak, Medeiros, & Ross, 2002). Predictably, young adults provide fewer verbal reports of magical thinking than children do (Subbotsky, 2001, 2004).

Despite decreases across childhood, belief in curses or spells persists into adulthood (Berenbaum, Boden, & Baker, 2009; Subbotsky, 2005, 2009). Adults also exhibit superstitions (e.g., reluctance to "tempt fate;" Keinan, 1994; Risen & Gilovich, 2008; Tykocinski, 2008), believe they can influence events from a distance (Pronin, Wegner, McCarthy, & Rodriguez, 2006), assume that physical contact confers properties like "evil" (*contagion*; Keinan, 1994; Nemeroff, 1995; White, 2009), and infer that objects that look alike are alike in other ways (*similarity*; Keinan, 1994). These self-reported beliefs inform behavior (e.g., knocking on wood; Zhang, Risen, & Hosey, 2014). In fact, bids at estate auctions reflect contagion beliefs: People's expectations about the amount of physical contact between a celebrity and a piece of memorabilia predict final bid values (Newman & Bloom, 2014).

Young adults clearly display magical beliefs, which may not persist with advancing age; accumulated experiences across the life span may make magical explanations less appealing. After several black cats cross one's path with no ensuing bad luck, for example, this superstition may wane. Similarly, belief in the ability to influence events from a distance may decline after crossing one's fingers exerts no effect. Over decades, people gain extensive experience with a range of events that seem magical, but can be replaced with logical explanations after feedback. In other words, childhood declines in magical thinking may continue across the life span.

This *experiential account* of developmental decreases in magical thinking is not the only possibility—a *meaning-making account* makes similar predictions. Following social exclusion, people endorse more superstitious beliefs, a relationship that is fully

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[1] Here, "magical thinking" does not include wishful thinking, religious beliefs, or conspiracy theories.

mediated by search for meaning (Graeupner & Coman, 2017). Crucially, meaning-making interacts with age; people search for meaning as they enter a new decade (e.g., at ages 29, 39, 49, etc.; Alter & Hershfield, 2014). More generally, adolescence and young adulthood involve identity formation; indeed, this sort of meaning-making may explain why people preferentially remember events from these ages (10–30 years old), producing a *reminiscence bump* (Fitzgerald, 1996; see Koppel & Rubin, 2016, for discussion of multiple bumps). Alea and Bluck (2013) also found that older Trinidadians use autobiographical memories to make meaning less than young Trinidadians. This pattern only partially replicated in an American sample, but it raises the possibility that older adults search for meaning, and thus engage in magical thinking, less frequently than young adults do.

On the other hand, the term *old wives' tale* may capture something true about the world, namely that magical thinking increases with age. This prediction follows from the *personal control theory* of magical thinking, wherein people engage in magical thinking to increase the perceived predictability of the world around them (see Keinan, 1994, 2002). When people lack control, they perceive illusory patterns, from seeing images in noise to endorsing superstitious explanations (Whitson & Galinsky, 2008). For example, living in areas prone to missile attack increases magical beliefs, particularly in individuals who are less tolerant of ambiguity (Keinan, 1994). This negative relationship between magical thinking and tolerance of ambiguity also holds in American undergraduates (Beitel, Ferrer, & Cecero, 2004). Given that tolerance of ambiguity declines in old age (Blanchard-Fields & Norris, 1994), we might expect magical beliefs to increase across adulthood.

One experiment hints that this is the case; Castel, Rossi, and McGillivray (2012) found that older adults are more likely than young adults to believe in the *hot hand* (i.e., that a basketball player is more likely to make a shot after making several shots than after missing one). Although players' successive shots are independent events (Gilovich, Vallone, & Tversky, 1985), people experience such "clusters" (i.e., successive shots) as causally related. This fallacy gains appeal with increasing "evidence" that it works—even experienced coaches and players believe in the hot hand (Attali, 2013). Notably, Castel and colleagues (2012) report an isolated finding, and the hot hand may be an exception rather than the rule. In addition, tolerance of ambiguity, a likely mechanism for this age-related pattern, was not measured.

In four experiments, we assessed whether developmental declines in magical thinking continue or reverse in old age. Participants indicated their agreement with magical and control beliefs related to housing (Experiments 1a and 1b) and cooking (Experiments 2a and 2b). Magical beliefs reflected superstition (e.g., Friday the 13th is an "unlucky" day), contagion (e.g., bad traits can be "picked up" from physical contact), and similarity (e.g., avoiding food in the shape of an undesirable object, like an insect). We used extreme age groups designs (Experiments 1a and 1b) and treated age as a continuous variable (Experiments 2a and 2b). Additionally, we assessed whether tolerance of ambiguity (Experiments 1a and 1b), domain-specific knowledge (Experiment 2a), or search for meaning (Experiment 2b) explained age-related differences.

Experiment 1a

Method

Participants. The Davidson College Institutional Review Board approved all procedures. Sixty Davidson College undergraduates (35 female; M age = 19.20 years, SD = 1.36) participated for course credit or monetary compensation.[2] Sixty-four community-dwelling older adults (44 female; M_{age} = 70.70 years, SD = 5.09) participated for monetary compensation. Older participants completed more years of formal education (M = 15.92, SD = 2.49) than young adults (M = 13.10, SD = 1.43), $t(122)$ = 7.67, $p < .001$. Education did not explain group differences here or in subsequent experiments.

Materials

Magical thinking questionnaire. We adapted Keinan's (1994) 16-item magical thinking questionnaire to focus on housing instead of the Gulf War. Our questionnaire included superstitious (e.g., *To be on the safe side, it is best to avoid signing a housing lease or contract on Friday the 13th*), contagion (e.g., *Sometimes it seems as if the housing market has been directly "infected" by someone with contagious bad luck*), similarity (e.g., *Destroying a photograph of someone's home means that bad things will happen to that person*), and control (e.g., *Only by dropping the price will an owner be able to rent or sell a house in today's market*) beliefs (see Table 1).

Tolerance of ambiguity questionnaire. Participants completed a 20-item questionnaire assessing their reactions to ambiguous events (e.g., *It bothers me when I am unable to follow another person's train of thought*; MacDonald, 1970). Participants rated their agreement with each statement on a five-point scale from *totally disagree* to *totally agree*.

Procedure. First, participants completed an unrelated task and responded to a tempting fate scenario (Tykocinski, 2008). We failed to replicate the basic effect (i.e., being "uninsured" did not inflate predictions of negative events) in either age group, so this task will not be discussed further (see van Wolferen, Inbar, & Zeelenberg, 2013, for another failure to replicate). Next, they completed the magical thinking questionnaire. They rated their agreement with each statement on a five-point scale from *totally disagree* to *totally agree*. Finally, they completed the tolerance of ambiguity questionnaire.

Results

The alpha level for all statistical tests was set to .05.

Magical thinking. We characterized the magical thinking questionnaire, a new measure adapted from Keinan (1994), using a confirmatory factor analysis (CFA; see Appendix). Item analysis and a post hoc factor analysis suggested the elimination of a double-barreled superstitious item (*We should not have joked so*

[2] Sixty Davidson College undergraduates completed the magical thinking questionnaire under divided attention, which did not influence magical thinking, Fs < 1. We only included these data in the factor analyses (see Appendix), where sample size is particularly important. Including this group does not change the age-related pattern in Experiment 1a.

Table 1
Magical Thinking Questionnaires

Item type	Housing (Experiments 1a and 1b)	Cooking (Experiments 2a and 2b)
Superstitious	It's a good idea to keep a good luck charm in the house to protect your family.	Spilling salt brings bad luck.
	People's jokes about the housing bubble probably contributed to the plummeting market.[a]	When people joke about burning an entrée, they increase the chance that it happens to them.
	It's good to keep a photograph of your loved ones in your home because it will lessen the chances of something bad happening to you.	Keeping pictures of family and friends in your kitchen lessens the chance of an oven fire or other mishap.
	To be on the safe side, it is best to avoid signing a housing lease or contract on Friday the 13th.	To be on the safe side, you're better off not hosting dinner parties on Friday the 13th.
Contagion	Sometimes it seems as if the housing market has been directly "infected" by someone with contagious bad luck.	You're better off avoiding fruit and vegetables that were touched by a bad person.
	I have a feeling that the chances of bad things happening are greater if a person lives in a home in which the last resident died.	The chances of a recipe going wrong increase when an unlucky cook helps to assemble the ingredients.
	If I move any previously-owned furniture into my house, I would prefer that it used to belong to a good person.[a]	It can be good luck to use kitchenware inherited from a loved one.
	When making a large purchase like a home, it wouldn't hurt to shake hands with a lucky person.	Before buying a new refrigerator, it wouldn't hurt to shake hands with a lucky person.
Similarity	Only if I find a realtor that I like will I be able to find a house that I like.	Using the same brand of knives as a TV chef will result in better-tasting meals.
	The for-sale sign for a house going missing while the house is under contract can bring about a deal falling through.	If you botch the preparation of the first dish of a meal, you will botch the preparation of the others, too.
	Destroying a photograph of someone's home means that bad things will happen to that person.	It would be disgusting to serve chocolates that are shaped like roaches.
	I would feel better if I bought a home that looked like one that received an architectural award.	I would be excited to use the same recipe as my favorite celebrity.
Control	Only by dropping the price will an owner be able to rent or sell a house in today's market.	People eat healthier if they prepare their own meals.
	Chances of predatory lenders exploiting future home buyers are great.	Recipe books are less important now that so much information is accessible on the Internet.
	Neighborhoods have a greater influence on renters and home buyers than many experts believe.	The quality of the spices used in a meal plays a bigger role than many people think.
	Mortgage lenders must continue to exercise maximum restraint.	Vegetarian dishes are likely to become more popular in the future.

[a] Items created to replace those excluded in Experiment 1a.

much about the housing bubble. The fact is that it turned out badly) and a contagion item that resembles similarity belief (*It would make me feel good to use design ideas from a photo spread about my favorite celebrity's home*). Responses to the remaining 10 magical items fit a single factor model equally as well as a three-factor model (reflecting superstitious, contagion, and similarity constructs). All relevant analyses, as well as Figure 1, eliminate the two problematic items.

In accordance with the single factor model, we conducted a one-way analysis of variance (ANOVA) on young and older

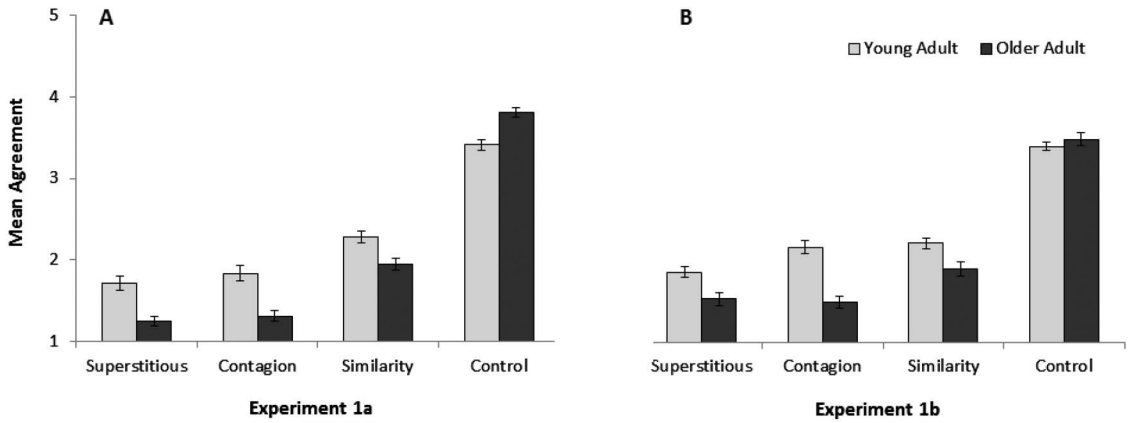

Figure 1. Mean agreement with each item type, graphed as a function of age, in Experiments 1a (Panel A) and 1b (Panel B). Error bars reflect standard error of the mean. Two problematic items are removed from (Panel A; see text for details).

adults' average responses to the remaining magical thinking items. Older adults indicated less agreement with magical beliefs (M = 1.54, SD = 0.38) than young adults did (M = 1.97, SD = 0.54), $F(1, 122) = 27.32$, $p < .001$, $\eta_p^2 = .18$. Exploratory one-way ANOVAs demonstrated that this age-related pattern held for each subtype of magical thinking (see Figure 1). Older adults gave lower agreement ratings for superstitious [older adult M = 1.24, SD = 0.47; young adult M = 1.71, SD = 0.66; $F(1, 122) = 20.51$, $p < .001$, $\eta_p^2 = .14$], contagion [older adult M = 1.31, SD = 0.53; young adult M = 1.83, SD = 0.75; $F(1, 122) = 19.75$, $p < .001$, $\eta_p^2 = .14$], and similarity [older adult M = 1.94, SD = 0.60; young adult M = 2.28, SD = 0.55; $F(1, 122) = 11.28$, $p = .001$, $\eta_p^2 = .085$] beliefs than young adults did. Critically, responses to control beliefs indicated that, if anything, older adults (M = 3.81, SD = 0.51) were more agreeable than young adults (M = 3.41, SD = 0.52), $F(1, 122) = 18.41$, $p < .001$, $\eta_p^2 = .13$.

Tolerance of ambiguity. We also conducted a one-way ANOVA on tolerance of ambiguity scores. Older adults' scores (M = 2.40, SD = 0.30) did not differ from young adults' scores (M = 2.40, SD = 0.34), $F < 1$. Collapsing across age, participants with less tolerance for ambiguity exhibited more magical thinking, $r(114) = -0.31$, $p = .001$, but this cannot account for the age-related declines in magical thinking given the similarity of older and young adults' scores.

Experiment 1b

We replicated the results of experiment 1a with an improved magical thinking questionnaire.

Method

Participants. Eighty-one Davidson College undergraduates (42 female; M age = 19.85 years, SD = 1.25) participated for course credit or monetary compensation. Fifty-six community-dwelling older adults (40 female; age M = 72.41 years, SD = 5.48) participated for monetary compensation. Older participants completed more years of formal education (M = 16.52, SD = 2.91) than young adults (M = 13.67, SD = 1.15), $t(135) = 7.96$, $p < .001$.

Materials. We used the magical thinking questionnaire from Experiment 1a with two modifications, based on the factor analysis results. We modified the double-barreled item (*We should not have joked so much about the housing bubble. The fact is that it turned out badly*) while retaining its meaning (*People's jokes about the housing bubble probably contributed to the plummeting market*). In addition, we replaced the contagion item removed from analyses (*It would make me feel good to use design ideas from a photo spread about my favorite celebrity's home*) with one that clearly reflects contagion (*If I move any previously owned furniture into my house, I would prefer that it used to belong to a good person*).

Procedure. First, participants completed two unrelated tasks. Next, they putted a golf ball (from 100 cm) in either a superstition-activated or a control condition (Damisch, Stoberock, & Mussweiler, 2010). We failed to replicate the basic effect (i.e., "lucky" ball did not boost performance) in either age group, so this task will not be discussed further (see Calin-Jageman & Caldwell, 2014, for another failure to replicate). After another unrelated task, participants briefly completed the magical thinking questionnaire. They rated their agreement with each statement on a five-point scale from *totally disagree* to *totally agree*. Finally, they completed the tolerance of ambiguity questionnaire from Experiment 1a.

Results

Magical thinking. We conducted a one-way ANOVA on young and older adults' average responses to the magical items. Older adults indicated less agreement with magical beliefs (M = 1.64, SD = 0.47) than young adults did (M = 2.07, SD = 0.51), $F(1, 135) = 26.24$, $p < .001$, $\eta_p^2 = .16$. Again, this pattern held for each subtype of magical thinking (see Figure 1). Older adults agreed less with superstitious [older adult M = 1.53, SD = 0.61; young adult M = 1.86, SD = 0.63; $F(1, 135) = 9.14$, $p = .003$, $\eta_p^2 = .06$], contagion [older adult M = 1.49, SD = 0.53; young adult M = 2.16, SD = 0.72; $F(1, 135) = 35.85$, $p < .001$, $\eta_p^2 = .21$], and similarity [older adult M = 1.89, SD = 0.65; young adult M = 2.21, SD = 0.57; $F(1, 135) = 8.95$, $p = .003$, $\eta_p^2 = .06$] beliefs than young adults. A one-way ANOVA identified no group differences in control beliefs; both older (M = 3.49, SD = 0.59) and young (M = 3.40, SD = 0.46) adults provided ratings approximately in the middle of the scale, $F < 1$.

Tolerance of ambiguity. We also conducted a one-way ANOVA on tolerance of ambiguity scores. Again, older adults' scores (M = 2.42, SD = 0.33) did not differ from young adults' scores (M = 2.32, SD = 0.33), $F(1, 135) = 3.26$, $p = .073$; participants with less tolerance for ambiguity exhibited more magical thinking, $r(135) = -0.22$, $p < .001$.

Discussion

Older adults exhibited less magical thinking than young adults in both Experiments 1a and 1b. Agreeableness did not drive this pattern: Compared with young adults, older adults indicated similar (Experiment 1b) or even more (Experiment 1a) agreement with control items. Participants with more tolerance of ambiguity endorsed fewer magical beliefs, replicating previous work (Beitel et al., 2004; Keinan, 1994, 2002). However, we observed no age-related differences in tolerance of ambiguity, unlike Blanchard-Fields and Norris (1994). It is possible that domain-specific knowledge explained our findings—older adults are much more likely to own homes than college students. Experiment 2a replicated our findings in a domain familiar to adults of all ages (cooking), included a measure of domain-specific knowledge, and treated age as a continuous variable.

Experiment 2a

Method

Participants. One-hundred workers (53 female) on Amazon Mechanical Turk (MTurk) participated for compensation. Their ages ranged from 21 to 63 years (M = 35.04, SD = 10.35), with a positively skewed distribution; most participants were in their 20s (n = 37) or 30s (n = 34), and fewer were in their 40s (n = 18), 50s (n = 8), and 60s (n = 3).

Materials

Magical thinking questionnaire. We created a 16-item questionnaire about cooking, rather than housing (see Table 1). This measure included superstitious (e.g., *Spilling salt brings bad luck*), contagion (e.g., *It can be good luck to use kitchenware inherited from a loved one*), similarity (e.g., *It would be disgusting to serve chocolates that are shaped like roaches*), and control (e.g., *Vegetarian dishes are likely to become more popular in the future*) beliefs.

Knowledge check. We selected 20 facts about cooking (e.g., *There are four sticks of butter in a pound*) that span a range of difficulty. We replaced a critical word in each statement with a blank, then provided three possible answers: the correct answer; a plausible, but incorrect, alternative; and *don't know*. For example, the question *Rinsing pasta removes a layer of starch and makes it ____ difficult for sauce to adhere* was accompanied by *more* (correct), *less* (incorrect), and *don't know* answer choices.

Procedure. First, participants completed the magical thinking questionnaire. They rated their agreement with each statement on a five-point scale from *totally disagree* to *totally agree*. Next, they completed the knowledge check by "filling in the blank" with one of three answer choices. Finally, they indicated how many times they cooked in an average week (open-ended response) and rated their overall level of experience with preparing food on a four-point scale from *very inexperienced* to *very experienced*.

Results

We computed multiple correlations, so we used a corrected p value of .01 for these tests.

Knowledge check. We first assessed knowledge check performance to ensure sufficient variability across participants. On average, participants answered half of the knowledge check questions correctly ($M = 0.50$, $SD = 0.18$). They responded to questions with wrong answers ($M = 0.23$, $SD = 0.15$) and "don't know" equally often ($M = 0.27$, $SD = 0.25$). Knowledge check performance increased with age, though this relationship was only marginally significant after correcting for multiple correlations, $r(98) = 0.22$, $p = .027$. Crucially, knowledge check performance was unrelated to magical thinking, $r(98) = -0.14$, $p = .157$. The proportion of questions answered correctly was entered into a stepwise multiple regression, reported below.

Familiarity with cooking. On average, participants indicated that they cook several times per week (range = 0–21 times/week; $M = 4.82$, $SD = 3.96$). They reported being "somewhat experienced" with preparing food ($M = 2.87$; $SD = 0.77$). These measures correlated with each other, $r(98) = 0.41$, $p < .001$, and self-rated familiarity also increased with knowledge check performance, $r(98) = 0.42$, $p < .001$. These self-reported familiarity variables were also entered into a stepwise multiple regression.

Magical thinking. Age, knowledge check performance, self-reported cooking time, and self-reported familiarity with cooking were used in a stepwise multiple regression to predict average magical thinking scores. See Table 2 for correlations among these variables (corrected p value = .01). The prediction model only included age (standardized $\beta = -0.27$), as none of the other variables explained enough unique variance to enter the equation. The model was statistically significant, $F(1, 98) = 7.54$, $p = .007$, and accounted for approximately 7% of the variance in magical thinking ($R^2 = .071$, adjusted $R^2 = .062$). Replicating Experiments 1a and 1b, magical thinking decreased with age, $r(98) = -0.27$, $p = .007$.

Table 2
Correlations Among Magical Thinking, Age, Knowledge, and Familiarity (Experiment 2a)

Measure	1	2	3	4	5
1. Magical thinking	—				
2. Age	−.27**	—			
3. Knowledge	−.14	.22*	—		
4. Weekly cooking	−.01	−.12	.18	—	
5. Familiarity	−.05	.05	.42**	.41**	—

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

Experiment 2b

The first three experiments document a decline in magical thinking across adulthood, which cannot be explained by tolerance of ambiguity (Experiments 1a and 1b) or domain-specific knowledge (Experiment 2a). Before concluding that domain-general experience is the mechanism for developmental declines, we considered one more alternative: meaning-making. In addition, we measured beliefs about how superstitions change with age.

Method

Participants. Two hundred and one workers (101 female) on MTurk participated for compensation. Their ages ranged from 19 to 67 years ($M = 36.24$, $SD = 10.80$), with a positively skewed distribution; most participants were in their late teens and 20s ($n = 63$) or 30s ($n = 71$), and fewer were in their 40s ($n = 39$), 50s ($n = 20$), and 60s ($n = 8$).

Materials. We used the magical thinking questionnaire from Experiment 2a.

Meaning in life questionnaire. Participants completed a 10-item questionnaire measuring the presence of (e.g., *My life has a clear sense of purpose*), and search for (e.g., *I am seeking a purpose or mission for my life*), meaning in their lives (Steger, Frazier, Oishi, & Kaler, 2006). Participants rated their agreement with each statement on a seven-point scale from *absolutely untrue* to *absolutely true*.

Procedure. Participants completed the magical thinking questionnaire, followed by the meaning in life questionnaire. Finally, they indicated their beliefs about superstitions across the life span by answering the question, *Compared with young adults, older adults (65 and over) are ____ superstitious*. Participants "filled in the blank" with one of three answer choices (*more*, *less*, *equally*).

Results

Meaning in life. On average, participants indicated that it was "somewhat true" that their lives already had meaning ($M = 4.78$, $SD = 1.56$). When asked if they were searching for meaning, responses came closer to "couldn't say" ($M = 4.49$, $SD = 1.64$). As expected, these subscales were negatively correlated, $r(199) = -0.30$, $p < .001$. Search for meaning decreased with age, $r(199) = -0.23$, $p = .001$.

Magical thinking. Age, search for meaning, and presence of meaning were used in a stepwise multiple regression to predict average magical thinking scores. See Table 3 for correlations among these variables (corrected p value = .01). The prediction model only included age (standardized $\beta = -0.23$), as none of the other variables explained enough unique variance to enter the equation. The model was statistically significant, $F(1, 199) = 11.10$, $p = .001$, and accounted for approximately 5% of the variance in magical thinking ($R^2 = .053$, adjusted $R^2 = .048$). Again, magical thinking decreased with age, $r(199) = -0.23$, $p = .001$.

Beliefs about age-related change. As expected, the majority of participants ($M = 54\%$) believed that older adults are more superstitious than their young counterparts. Relatively fewer participants indicated that older adults are equally ($M = 26\%$) or less ($M = 20\%$) superstitious compared with young adults.

General Discussion

The current studies directly tested whether older adults hold more superstitions than young adults do. Across four experiments, magical thinking actually declined with age, suggesting that the term *old wives' tale* is a misnomer. This pattern generalized across domains (housing, cooking), subtypes of illogical causal beliefs (superstitious, contagion, similarity), and study designs (extreme age groups, continuous age variable). Tolerance of ambiguity (Experiments 1a and 1b), domain-specific knowledge (Experiment 2a), and search for meaning (Experiment 2b) did not mediate this decline.

These findings are counterintuitive: few people (20% in Experiment 2b) believe that older adults are less superstitious than their young counterparts. They also stand in stark contrast to older adults' underperformance on abstract reasoning tasks in the laboratory (e.g., Raven's Progressive Matrices; Salthouse, 2005). Salthouse (2012), however, notes a striking discrepancy between such tasks and daily life: Abstract decision-making abilities peak around 30, but the peak age for primary decision makers in Fortune 500 companies (chief executive officers; CEOs) approaches 60. Indeed, experience allows older adults to make sound judgments, even in the face of cognitive declines (e.g., Tentori, Osherson, Hasher, & May, 2001; Worthy, Gorlick, Pacheco, Schnyer, & Maddox, 2011). For example, *social expertise* leads older adults to qualitatively different approaches than young adults, whether assigning blame (Blanchard-Fields, 1994), forming impressions (Hess & Auman, 2001), or predicting the outcomes of social conflicts (Grossman et al., 2010). Magical thinking can be positive—it spares problem solving after uncontrollable events (Dudley, 1999) but it also leaves people vulnerable to risky behaviors like gambling (Joukhador, Blaszczynski, & Maccallum, 2004). Tellingly, people over 70 gamble on the lottery much less in a given year (45%) than people in their twenties and thirties (70%; Barnes, Welte, Tidwell, & Hoffman, 2011).

Over time, superstitions inevitably fail to predict outcomes in our daily lives. The finding that older adults engage in less magical thinking than their young counterparts is consistent with declines observed across childhood (Evans et al., 2002; Phelps & Woolley, 1994). An *experiential account* accommodates this trajectory, wherein magical explanations lose their appeal over time. Notably, children "replace" magical beliefs with concrete, physical explanations (e.g., magnetism) in a *domain-specific* manner. Our data suggest that adults, on the other hand, extract *domain-general* principles (e.g., things that look alike are not necessarily similar in other ways) across a variety of experiences. Knowledge of specific facts about cooking (e.g., that heated oil moves in "fingers") bore no relationship to magical beliefs (e.g., *You're better off avoiding fruit and vegetables that were touched by a bad person*) in that same domain. This account allows people to build up expertise in how the world typically works, regardless of whether or not they become experts in any particular domain.

Critically, discounting magical beliefs requires accumulating evidence that they do not work (i.e., negative feedback). Beliefs like the hot hand actually gain appeal over time; each streak in a random sequence (i.e., sequential baskets by the same player) seems to be supporting "evidence," and confirmation bias may prevent fans from noticing when baskets follow missed shots. The hot hand is so intuitive that Gilovich and colleagues (1985) had to demonstrate mathematically that "streak shooting" does not exist. An experiential account accommodates Castel and colleagues (2012) finding that older adults endorse the hot hand more than young adults do, because age-related declines in magical thinking depend on registering negative feedback over time.

Tolerance of ambiguity and search for meaning cannot explain older adults' reduced magical thinking, but other traits probably inform their approach to causal judgments. For example, *anticipated regret*, or regret we expect to experience in the future, may contribute to older adults' advantage. Regret aversion leads to superstitious behaviors, particularly the reluctance to "tempt fate" (Miller & Taylor, 1995). Interestingly, older adults report less experienced and anticipated regret than young adults for everyday events (Bjälkebring, Västfjäll, & Johansson, 2013). Situational factors, such as personal agency and the stakes of a decision, likely influence judgments as well. While buying a home (Experiments 1a and 1b) entails a great deal of personal agency and potentially serious consequences, watching a sports event involves neither; older fans may be just as likely as their young counterparts to take part in game rituals (e.g., rally caps worn by baseball fans). In addition, not all "old wives' tales" are misguided—some of these sayings (e.g., *An apple a day keeps the doctor away*, *Count sheep to fall asleep*) include a kernel of truth (i.e., are not illogical, or "magical"), and thus these beliefs may not change with age.

Disproving most people's belief that older adults are especially superstitious (Experiment 2b), magical thinking decreases steadily across adulthood. Like the Baltes approach to wisdom (e.g., Baltes, Staudinger, Maercker, & Smith, 1995), an experiential account contends that relevant experience, rather than chronological age per se, underlies reductions in magical thinking. Not all older

Table 3
Correlations Among Magical Thinking, Age, and Meaning Making (Experiment 2b)

Measure	1	2	3	4
1. Magical thinking	—			
2. Age	−.23**	—		
3. Search for meaning	.13	−.23**	—	
4. Presence of meaning	.03	.03	−.30**	—

** $p < .01$.

adults are "wise" (e.g., Ardelt, 2010; Baltes & Staudinger, 2000; Baltes et al., 1995) – only individuals with specific personality traits (e.g., openness to experience) and life experiences (e.g., mentorship) meet the extensive criteria for "wise" responses (see Staudinger, Smith, & Baltes, 1992). Age-related declines in magical thinking occur more reliably. After several black cats cross older adults' paths, they learn that "bad luck" will not follow.

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Appendix

Factor Analyses

Table A1
Goodness-of-Fit Indicators of Models for Magical Thinking Questionnaire

Model	χ^2	*df*	*p*	CFI	TLI	RMSEA
Single factor	176.05	54	0	.655	.578	.111
Three factor	89.03	51	.001	.892	.861	.064
Modified single factor	36.91	35	.381	.993	.991	.017
Modified three factor	32.8	32	.428	.997	.996	.012

Note. A comparative fit index (CFI) and/or Tucker–Lewis coefficient (TLI) close to one indicates very good fit. A root mean square error of approximation (RMSEA) less than .05 indicates good fit, whereas an RMSEA value between .05 and .08 indicates acceptable fit.

We characterized Experiment 1a's magical thinking questionnaire with a CFA and an exploratory analysis using AMOS structural equation modeling software. Initially, we compared the hypothesized 12-item, three-factor (superstitious, contagion, similarity) model to a single factor model. Both models fit poorly (see Table A1).

Item analysis suggested two reasons for the models' poor fit. One superstitious item (*We should not have joked so much about the housing bubble. The fact is that it turned out badly*) loaded poorly on all factors; some participants responded to the initial statement (disagreeing with the magical sentence) and others responded to the second statement (agreeing with an undeniable fact about the housing market). Additionally, two conceptually-related items exhibited highly correlated responses. One item (*I would feel better if I bought a home that looked like one that received an architectural award*) theoretically reflects similarity, whereas the other (*It would make me feel good to use design ideas from a photo spread about my favorite celebrity's home*) theoretically reflects contagion. In a post hoc analysis, we developed a modified three-factor model that excluded the double-barreled item and the problematic contagion item. The modified model fits very well (see Table A1), but no better than a modified single factor model included for comparison. Parsimony dictates accepting the simpler, single factor model. Thus, a single magical thinking variable accounts for responses to all item types.

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