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When poignant stories outweigh cold hard facts: A meta-analysis of the anecdotal bias

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Abstract:

The objective of this paper is to resolve mixed findings about which type of evidence is more persuasive—statistical or anecdotal information. In a meta-analysis of 61 papers exploring the persuasive impact of evidence type, we establish that, in situations where emotional engagement is high (e.g., an issue associated with a severe threat, involving a health issue, or affecting oneself), statistical evidence is less influential than anecdotal evidence. However, in situations where emotional engagement is relatively low (e.g., an issue associated with low threat severity, involving a non-health issue, or affecting others), statistical evidence is more persuasive than anecdotal evidence. We discuss the theoretical and practical implications of these findings, and how to improve persuasive messaging by considering the contextual effectiveness of both anecdotes and statistics.

Keywords: anecdotal evidence | statistical evidence | meta-analysis | persuasion

Article:

Imagine a situation where the new hiring manager for a large multinational accounting/professional services firm is tasked with evaluating the recruiting policies of the organization to attract and retain the best talent in the industry. A fellow manager encourages him to continue recruiting accounting students from top college campuses because she hired a recent accounting graduate who turned out to be very suitable for the position. However, the new hiring manager also comes across an interesting report that uses industry data to show that more seasoned employees who have been hired away from other firms are typically more productive and require fewer resources for training. Focusing on more mature job candidates who have some prior experience would represent a policy shift for the organization and require a bit of retooling, so the hiring manager wants to make sure he makes the right decision. In this scenario, the report provides abstract statistical evidence, while the fellow manager expresses a contradictory anecdotal opinion.

Statistical evidence is broadly defined as empirically quantifiable information about objects, persons, concepts, or phenomena, whereas anecdotal evidence includes narratives, personal anecdotes, case histories, personal stories, and testimonies (Church and Wilbanks, 1986,

Kazoleas, 1993, Yang et al., 2015). While statistical evidence *should* be more informative, there are numerous instances where anecdotal evidence is found to be more persuasive. As Griffin and Tversky (1992) point out, “the tendency to prefer an individual or ‘inside’ view rather than a statistical or ‘outside’ view represents one of the major departures of intuitive judgment from normative theory” (p. 431).

A multitude of studies have compared the persuasive impact of statistical evidence to that of anecdotal evidence; however, thus far there has been no consensus about which is more impactful. For example, in his seminal narrative review of nine articles examining the relative effectiveness of evidence types in the communication field, Reinard (1988) surmises that “a body of research has shown—all other things being equal—anecdotal reports may have more persuasive impact than statistics” (p. 24). Additional support for this conclusion is provided by Winterbottom, Bekker, Conner, and Mooney (2008), who examine 17 papers investigating the influence of anecdotal information in the context of health-related choices. Their findings indicate that anecdotal evidence is persuasively superior to statistical evidence, stating that “narrative information influenced decision making more than... statistically based information in approximately a third of the studies” (p. 2079). Similarly, Baesler and Burgoon (1994) employ a vote-counting approach in their literature review to summarize the outcomes of 19 communication articles pitting anecdotal reports against statistics within the same study. These researchers suggest that “anecdotal evidence is more persuasive than statistical evidence,” because 13 of the 19 studies document a greater persuasive effect for anecdotal evidence—while four studies find no differences between the persuasion of anecdotal and statistical information, and only two studies demonstrate greater persuasiveness for statistical evidence. However, in a follow-up experiment, these authors find statistical evidence to be more persuasive than story (anecdotal) evidence.

A summary by Allen and Preiss (1997) reinforces Baesler and Burgoon (1994) experimental results (i.e., the superiority of statistical evidence), based on an examination of 15 studies from the communication literature. Additionally, Hornikx (2005a) highlights definitional and operational differences across communication studies as a possible explanation for such equivocal results, and imposes more stringent inclusion criteria in his qualitative review of 12 experiments exploring the empirical effects of anecdotal and statistical information. Hornikx (2005a), like Allen and Preiss (1997), concludes that statistical evidence is more persuasive in half of the studies examined, no significant differences are found in five studies, and, anecdotal evidence proves to be more persuasive in only one study. More recently, Zebregs, van den Putte, Neijens, and de Graaf (2015) compare the effects of statistical and anecdotal evidence in a meta-analysis of 15 studies on persuasive health communications. Statistical evidence is shown to have a greater persuasive impact than anecdotal evidence on beliefs and attitudes, while the reverse is found for intentions.

In sum, the literature is inconclusive on the relative persuasiveness of anecdotal versus statistical evidence. Contrary to extant systematic reviews, in our investigation we employ meta-analysis to systematically examine the role of different situational factors that could have moderating effects and cause statistical evidence to be more, less, or equally persuasive as anecdotal evidence. Notably, our use of meta-analysis and focus on independent variables as moderators distinguishes the current study from previous systematic reviews. As shown in Table 1, only two

previous systematic reviews (Allen and Preiss, 1997, Zebregs et al., 2015) use the meta-analytic approach. Allen and Preiss (1997) report significant heterogeneity across studies comprising their meta-analytic database—warning that “any interpretation of the average effect must be made cautiously since there is evidence of the existence of possible moderator variables” (p. 127). However, these authors do not conduct a moderator analysis. Although Zebregs et al. (2015) classify outcome measures into three groups—namely beliefs, attitudes, and intentions—they do not examine any independent variables as moderators, which is the focus of our study. Also, in their study, a multivariate moderator analysis of the main effect for each dependent variable was not possible, given the extremely limited number of studies measuring each outcome ($N_{\text{beliefs}} = 9$ studies; $N_{\text{attitudes}} = 5$ studies; $N_{\text{intentions}} = 7$ studies).

The remaining systematic reviews (non-meta-analytic; e.g., Reinard, 1988, Winterbottom et al., 2008) differ from our study in two important ways. First, these studies are qualitative literature reviews, not meta-analyses. As a result, their conclusions are based solely on selective interpretations of a selection of works on this topic. Second, the focus of these studies is not on the relative effectiveness of statistical versus anecdotal evidence. Rather, these reviews assume the superiority of anecdotal evidence (over statistical evidence) and focus only on the effectiveness of anecdotal evidence. Therefore, the moderators discussed in these studies relate to characteristics of anecdotal evidence, such as source credibility, vividness of the narratives, and first-person vs. third-person narratives.

In this research, we expand the purview of extant reviews and conduct a multivariate moderator analysis to more closely examine boundary conditions to the impact of evidence type of persuasion. As a result, the current research aims to extend previous work on this topic in several important ways. **First**, since all of the aforementioned articles contain a different collection of studies, we carefully examine each cited paper in these reviews to identify all the studies that compare the effects of anecdotal information versus statistical evidence. Collectively, these studies form the meta-analytic database of our research, allowing us to exhaustively compare the persuasiveness of statistical vs. anecdotal evidence and to examine the boundary conditions of their relative effectiveness.

Table 1. Summary of Systematic Review Papers in the Literature.

Citation	Number of Studies	Issue/Topic	Dependent Variable	Relative Effectiveness ¹	
Allen and Preiss (1997) ²	16	10 Refrigerators; Technology – ATM; Juvenile delinquents; Welfare recipient/prison guard; Safety-belt; Ion Machine; Behaviors categories; Technology – ATM	Persuasiveness	Anecdotal < Statistical	
		4 Science programs in school; Alcohol use; Government decisions budget/Royalty	Persuasiveness	Anecdotal > Statistical	
		2 Labor economics; Alcohol education	Persuasiveness	Anecdotal = Statistical	
Baesler and Burgoon (1994)	19	2 Refrigerators; Behaviors categories	Persuasiveness	Anecdotal < Statistical	
		13 General behavior - probability; Instructor evaluation; Recidivism; Individuals' traits; Welfare recipient/prison guard; Abortion; Person occupation; Safety-belt; Science programs in school; General behaviors; Printed news	Persuasiveness	Anecdotal > Statistical	
		4 News; Ion machine; Labor economics	Persuasiveness	Anecdotal = Statistical	
Hornikx (2005a)	12	6 Cosmetics; Juvenile delinquency; Refrigerators; Skin cancer-medical claims; Digital camera; Alcohol education	Persuasiveness	Anecdotal < Statistical	
		1 Science programs in schools	Persuasiveness	Anecdotal > Statistical	
		5 Crime, internships & birth-control; Mammograms – breast cancer; Theft, injury, & relaxation rooms; Safety-belts; Alcohol use	Persuasiveness	Anecdotal = Statistical	
Reinard (1988) ²	9	5 General behaviors; Instructors evaluation; Cabs accident; Person occupation; Cabs accidents	Persuasiveness	Anecdotal > Statistical	
		2 GPA/Grades; Welfare recipient/prison guard	Persuasiveness	Anecdotal = Statistical	
Reinhart (2006)	18	6 Firefighters preference for risk; Refrigerators; Science programs in schools; Health behaviors; Alcohol use	Persuasiveness	Anecdotal < Statistical	
		3 Skin cancer-medical claims; Academic schedule; Ion machine;	Persuasiveness	Anecdotal > Statistical	
		9 Cosmetics; Juvenile delinquents; Crime, internships & birth-control; Organ & tissue donors; Organ & tissue donation; Tanning bed; Safety-belts; Alcohol education	Persuasiveness	Anecdotal = Statistical	
Winterbottom et al. (2008)	17	5 Health-related choices	Persuasiveness	Anecdotal > Statistical	
		12 Health-related choices	Persuasiveness	N/A (focused only on anecdotal evidence)	
Zebregs et al. (2015) ²	9	5 Crime, internships & birth-control; Juvenile Delinquency; Tanning-bed use; Government plans; Switching to other general practitioner	Beliefs	Anecdotal < Statistical	
		1 Automobiles	Beliefs	Anecdotal > Statistical	
		3 Sexual risk behavior; Tanning-bed use; Fetal alcohol spectrum disorder	Beliefs	Anecdotal = Statistical	
		3 Exercising; Safety-belts; Global warming	Attitude	Anecdotal < Statistical	
		5	1 Digital camera	Attitude	Anecdotal > Statistical
		1 Sunbathing and tanning-bed use	Attitude	Anecdotal = Statistical	
		7	1 Fetal alcohol spectrum disorder	Intention	Anecdotal < Statistical

Citation	Number of Studies	Issue/Topic	Dependent Variable	Relative Effectiveness ¹
	5	Sexual risk behavior; Exercising; Tanning-bed use; Medicine	Intention	Anecdotal > Statistical
	1	Switching to other general practitioner	Intention	Anecdotal = Statistical
	2	General behaviors; Individuals' traits	Persuasiveness	Anecdotal < Statistical

Note:

1. Anecdotal evidence and statistical evidence in some of the studies are not exactly the same as what we defined in the present paper, because hybrid messages are treated as either anecdotal evidence or statistical evidence in these papers. Our paper does not contain hybrid messages. The categorization of the evidence type in these studies was based on the relevant information that we were able to find in each study.
2. These papers are meta-analytical studies, and used correlations and Cohen's *d* in their studies.

Table 2. Details of Studies Comprising Meta-Analytic Database.

Paper	Issue/topic	Anecdotal Stimuli	Statistical Stimuli	Dependent Variable	Relative Effectiveness
Baesler (1997)	Birth control; crime; Internships	Stories based on the opinion of a single individual, with a scene, characters, plot, and resolution	Statistics based on large samples, presented as percentages and simple odds (e.g., 80%, 4 out of 10)	Beliefs	Anecdotal < Statistical
Baesler and Burgoon (1994)	Juvenile delinquency	Stories with information about a single person and a scene, characters, conflict, and resolution	Statistical messages with numeric information presented as simple percentages or odds (e.g., 80% or 8 out of 10)	Perceived persuasiveness	Anecdotal < Statistical (1-week delay) Anecdotal < Statistical (48-hour delay) Anecdotal < Statistical (no delay)
Berger (2007) – Study 1	Theft/injury	Edited news stories	Edited news stories that include percentages/rates	Seriousness of the problem; Probative value	Anecdotal < Statistical (high rationals) Anecdotal = Statistical (low rationals) Anecdotal = Statistical (high rationals) Anecdotal = Statistical (low rationals)
Berger (2007) – Study 2	Theft/injury	Edited news stories	Edited news stories that include percentages/rates and linear trend and growth conditions	Seriousness of the problem	Anecdotal = Statistical
Braker (2013)	Charitable cause	Fundraising message with anecdotal information about a specific heart patient	Fundraising message with statistical information (e.g., 70% of patients have medical problems)	Donation intentions	Anecdotal > Statistical

Paper	Issue/topic	Anecdotal Stimuli	Statistical Stimuli	Dependent Variable	Relative Effectiveness
Braverman (2008) – Study 1	Weight loss through drinking water	Story about an individual's experience with losing weight through drinking water	Message highlighting water as the most important (number one) factor leading to weight loss	Message persuasion	Anecdotal = Statistical (audio message) Anecdotal < Statistical (written message) Anecdotal < Statistical (high involvement participants) Anecdotal = Statistical (low involvement participants)
Braverman (2008) – Study 2	Cessation of alcohol consumption	Story about an adult's alcohol problem	Message highlighting the probability of young adult viewing alcohol consumption as a serious problem.	Message persuasion	Anecdotal = Statistical (audio message) Anecdotal = Statistical (high involvement participants) Anecdotal = Statistical (low involvement participants)
Braverman (2008) – Study 3	Weight loss through drinking water	Story about an individual's experience with losing weight through drinking water	Message highlighting water as the most important (number one) factor leading to weight loss	Message persuasion	Anecdotal = Statistical (high need for cognition participants) Anecdotal = Statistical (low need for cognition participants)
Cox and Cox (2001)	Mammogram	Story about one woman's experience with breast cancer	Statistical message highlighting percentages of women more or less likely to die of breast cancer	Perceived value of the ad; Perceived likelihood of having a mammogram; Overall attitude toward mammography	Anecdotal > Statistical (loss frames) Anecdotal < Statistical (gain frames) Anecdotal > Statistical (loss frames) Anecdotal < Statistical (gain frames) Anecdotal > Statistical (loss frames) Anecdotal < Statistical (gain frames)
Czerwinka and Praxmarer-Carus (2014) – Study 1	Speeding	Message about one individual who became a quadriplegic after an accident caused by speeding	Message reporting number of people in Germany injured in car accidents caused by speeding	Intentions to reduce risky behavior	Anecdotal = Statistical
Czerwinka and Praxmarer-Carus (2014) – Study 2	Speeding	Message about one individual who became a quadriplegic after an accident caused by speeding	Message reporting number of people in Germany injured in car accidents caused by speeding	Intentions to reduce risky behavior	Anecdotal > Statistical
Dardis and Shen (2008) – Study 1	Product evaluation (mouthwash)	Ads with anecdotal information about a	Ads with percentages about product usage	Ad attitudes; Purchase intentions; Brand attitudes	Anecdotal < Statistical (loss frames) Anecdotal = Statistical (gain frames) Anecdotal < Statistical (loss frames)

Paper	Issue/topic	Anecdotal Stimuli	Statistical Stimuli	Dependent Variable	Relative Effectiveness
		mouthwash user (exemplar)			Anecdotal = Statistical (gain frames) Anecdotal < Statistical (loss frames) Anecdotal = Statistical (gain frames)
Dardis and Shen (2008) – Study 2	Product evaluation (office paper shredder)	Ads with anecdotal information about the user (exemplar) of a new office paper shredder	Ads with percentages about product usage	Ad attitudes; Purchase intentions; Brand attitudes	Anecdotal = Statistical (loss frames) Anecdotal < Statistical (gain frames) Anecdotal < Statistical (loss frames) Anecdotal = Statistical (gain frames) Anecdotal = Statistical (loss frames) Anecdotal = Statistical (gain frames)
Das, Kerkhof, and Kuiper (2008)	Charity for Leprosy	Story about one young leprosy patient	Statistics about the number/percentages of leprosy patients	Attitude toward the message	Anecdotal = Statistical Anecdotal > Statistical (gain frames) Anecdotal < Statistical (loss frames)
De Wit et al. (2008)	Vaccination for Hepatitis B virus (HBV)	Story about a fictitious person with HBV	Proportions and percentages about HBV	Intentions to obtain a vaccination	Anecdotal > Statistical
Dickson (1982)	Product failure (refrigerator)	Case history report describing expectations of a product failure	Summary statistics including percentages, time frame and research findings	Estimates of failure rate out of 20; Perceptions of failure likelihood	Anecdotal > Statistical Anecdotal > Statistical
Farley, 2017b, Farley, 2017a	Media violence	Story about one 23-year old male's experience with the effects of violent media	Percentages about outcomes associated with media consumption	Attitudes toward violent media consumption; Intentions to decrease consumption of violent media	Anecdotal = Statistical Anecdotal = Statistical
Feeley, Marshall, and Reinhart (2006)	Organ and tissue donation	Anecdotal information about the importance and benefits of organ donation	General statics about the importance and benefits of organ donation	Message ratings	Anecdotal > Statistical (Time 1) Anecdotal > Statistical (Time 2) Anecdotal > Statistical (Time 1) Anecdotal > Statistical (Time 2)
Freriksen (2014)	Acute Myeloid Leukemia	Ad with a story of one young girl (exemplar) promoting childhood cancer charitable organization	Ad with a statistical headline and general and statistical information about childhood cancer	Donation perceptions	Anecdotal = Statistical
Gibson, Callison, and Zillmann (2011)	Traveler's diarrhea	Message about persons (exemplars) suffering from diarrhea	Message with percentages about diarrhea	Perceptions of informativeness	Anecdotal > Statistical

Paper	Issue/topic	Anecdotal Stimuli	Statistical Stimuli	Dependent Variable	Relative Effectiveness
Gray and Harrington (2011)	Exercise	Story about two individuals' exercising habits and lifestyle	Statistical information about average time spent exercising, percentages about exercising and its benefits	Attitudes toward exercise; Intentions to exercise; Perceived message effectiveness	Anecdotal = Statistical (gain frames) Anecdotal = Statistical (loss frames) Anecdotal = Statistical (gain frames) Anecdotal > Statistical (loss frames) Anecdotal = Statistical (gain frames) Anecdotal = Statistical (loss frames)
Greene & Brinn, 2003	Tanning bed usage/skin cancer	Story about a young woman who used tanning beds and later developed facial skin cancer	Statistical information about risks associated with using tanning beds and skin cancer	Tanning bed usage in the past 30 days; Tanning bed behavior change; Intentions to tan; Intentions to use a tanning bed; Perceived persuasiveness	Anecdotal = Statistical Anecdotal = Statistical Anecdotal = Statistical Anecdotal = Statistical Anecdotal = Statistical
Greene, Campo, and Banerjee (2010)	Tanning bed usage	History of a young woman who used tanning beds and later developed facial skin cancer	Statistical proof about the risks associated with using tanning beds and information about skin cancer	Intentions to use tanning beds; Beliefs about protection; Beliefs about consequences	Anecdotal = Statistical Anecdotal = Statistical Anecdotal = Statistical
Guo et al. (2019)	Carbon dioxide power plant building; Tanning bed usage/skin cancer	Narrative information about the importance of carbon dioxide in reducing global carbon dioxide emissions	Statistical evidence (percentages) about using carbon capture technology to reduce carbon dioxide emissions.	Attitudes toward having capture/store carbon dioxide power plants near one's home	Anecdotal = Statistical
Han and Fink (2012)	Tuition increase; Year-round school schedule	Interview with one student	General statistics	Perceived persuasiveness	Anecdotal = Statistical (small amount of evidence) Anecdotal < Statistical (large amount of evidence) Anecdotal < Statistical (low perceived vividness) Anecdotal > Statistical (high perceived vividness) Anecdotal < Statistical (large amount of evidence) Anecdotal < Statistical (large amount of evidence)

Paper	Issue/topic	Anecdotal Stimuli	Statistical Stimuli	Dependent Variable	Relative Effectiveness
Hardy (2011)	Poverty	Personal story about poverty	Statistical information about poverty	Risk perceptions	Anecdotal = Statistical
Hinnant, Subramanian, and Young (2016)	Environmental issues	News story about the impact of environmental health	Empirical scientific evidence (numbers, graphs and research results) about the environment	Risk perceptions	Anecdotal < Statistical
Hoeken (2001a)	Local tax increase to fund cultural center	Newspaper article describing a similar cultural center in another city	Newspaper article referencing a study by the Dutch Organization of Municipalities	Claim acceptance	Anecdotal < Statistical
Hoeken (2001b)	Local tax increase to put streetlights on sidewalks	Newspaper article about another city that installed extra streetlights and decreased the number of burglaries	Newspapers article referencing a study by the Dutch Center for Mental Health and citing negative side effects of being a crime victim	Claim acceptance; attitudes	Anecdotal = Statistical Anecdotal = Statistical (probability claims) Anecdotal < Statistical (desirability claims)
Hoeken and Hustinx (2003)	Varied	Message describing the experience of one individual	Message with a numerical summary of a large number of cases with percentages	Perceived persuasiveness	Statistical > Anecdotal
Hoeken and Hustinx (2006)	Varied	Message describing the experience of one individual	Message with a numerical summary of a large number of cases with percentages	Probability of consequence occurring	Anecdotal < Statistical
Hoeken and Hustinx (2006) – Study 2	Varied	Message describing the experience of one individual	Message with a numerical summary of a large number of cases with percentages	Probability of outcome occurring	Anecdotal = Statistical (general claims) Anecdotal = Statistical (specific claims)
Hoeken and Hustinx (2009) – Study 1	Varied	Message describing the experience of one individual	Message with a numerical summary of a large number of cases with percentages	Probability of outcome occurring	Anecdotal < Statistical
Hoeken and Hustinx (2009) – Study 2	Varied	Message describing the experience of one individual	Message with a numerical summary of a large number of cases with percentages	Probability of outcome occurring	Anecdotal < Statistical Anecdotal = Statistical
Hoeken and Hustinx (2009) – Study 3	Varied	Message describing the experience of one individual	Message with a numerical summary of a large number of cases with percentages	Perceived persuasiveness	Anecdotal = Statistical
Hong (2011)	Skin cancer	Personal story	Statistical evidence with incidence/death rates	Attitudes toward detection behaviors; Intentions toward getting a professional skin	Anecdotal > Statistical (gain frames) Anecdotal = Statistical (loss frames) Anecdotal = Statistical (gain frames) Anecdotal = Statistical (loss frames) Anecdotal = Statistical (gain frames)

Paper	Issue/topic	Anecdotal Stimuli	Statistical Stimuli	Dependent Variable	Relative Effectiveness
				exam; Intention to engage in monthly self-exam	Anecdotal = Statistical (loss frames)
Hong and Park (2012)	Product evaluation (digital camera)	Examples of narrative reviews based on personal judgment	Aggregate product ratings	Attitudes toward the product	Anecdotal = Statistical Anecdotal = Statistical (negative review) Anecdotal = Statistical (positive review)
Hornikx (2005b) – Study 2	Varied	Message describing the experience of one individual	Message with a numerical summary of a large number of cases with percentages	Expected persuasiveness	Anecdotal < Statistical (Dutch participation) Anecdotal < Statistical (French participants)
Hornikx (2005b) – Study 3	Varied	Message describing the experience of one individual	Message with a numerical summary of a large number of cases with percentages	Actual persuasiveness	Anecdotal < Statistical (Dutch participants) Anecdotal < Statistical (French participants)
Hornikx and de Best (2011)	Varied	Message describing the experience of one individual	Message with a numerical summary of a large number of cases with percentages	Persuasiveness	Anecdotal < Statistical
Hornikx and de Best (2007)	Varied	Message describing the experience of one individual	Message describing results of study researching the experiences of many participants	Perceived probability	Anecdotal < Statistical (Dutch participants) Anecdotal < Statistical (French participants)
Hornikx and Hoeken (2011)	Public policy (waste)	Newspaper article about another city that increased the price of bottled water and reduced waste on the streets	Newspapers article referencing a study of 14 towns by the Association of Dutch Towns, citing the positive impact of increasing the price of bottled water on street waste	Attitudes toward the claim; Claim beliefs	Anecdotal = Statistical Anecdotal = Statistical
Jain, Hoffman, Beam, and Xu (2017)	Sexually transmitted infections (STIs)	Testimonial evidence	Statistical evidence (numbers/data)	Attitude accessibility	Anecdotal > Statistical
Kaplan and Frosch (1993)	Use of safety belts	Story about an individual who experienced an automobile crash and how the seatbelt saved him	Percentages from recent investigations into nonfatal automobile crashes and the importance of safety belt in saving lives	Attitude persistence	Anecdotal > Statistical

Paper	Issue/topic	Anecdotal Stimuli	Statistical Stimuli	Dependent Variable	Relative Effectiveness
Kim et al. (2012)	Global warming	Story of specific example on how not global warming---but deforestation at the base of a mountain---has caused glaciers to retreat	Statistical information on the rate of the advance/retreat of 50 international glaciers, with the annual decline/increase in number of feet	Attitudes	Anecdotal < Statistical
Kopfman et al. (1998)	Organ donation	Scenario of actual organ donors and recipients	Statistical evidence reporting totals of organ transplants and people in need of an organ transplant	Message ratings	Anecdotal > Statistical
Krupat, Smith, Leach, and Jackson (1997)	Product evaluation (car)	Short essay about one customer's experience with a car	Averages, rates and percentages about characteristics of/complaints regarding a car	Impressions of the product	Anecdotal < Statistical
Limon and Kazoleas (2004)	Dangers of tanning	Story about a girl with skin cancer	Total number of skin cancer-related deaths	Cognitive responses	Anecdotal < Statistical
Lindsey and Yun (2003)	Year-round school schedule	Message comprised of examples, anecdotes, and personal stories	Message with statistical/numerical information (percentages and numbers)	Attitudes	Anecdotal < Statistical
Major and Coleman (2012)	HIV/AIDS	Story about the life-saving benefits associated with using condoms	Message with statistical evidence, including percentages about the benefits associated with using condoms	Message effectiveness	Anecdotal < Statistical
Mazor et al. (2007)	Medication for coagulation	Dialogue based on a patient's story	Statistical information (proportions) from research studies	Belief that Warfarin (anticoagulation medication) is worrisome; Belief that Warfarin (anticoagulation medication) is beneficial	Anecdotal = Statistical Anecdotal = Statistical Anecdotal = Statistical
McKinley, Limbu, and Jayachandran (2017) – Study 1	Smoking	Exemplar story about one individual's experience with smoking and how it lead to lung cancer	Statistical message including aggregated data on the risk of lung cancer among smokers and probability of having a heart attack	Intentions to stop smoking	Anecdotal < Statistical

Paper	Issue/topic	Anecdotal Stimuli	Statistical Stimuli	Dependent Variable	Relative Effectiveness
McKinley et al. (2017) – Study 2	Breast cancer	Exemplar story about breast cancer treatment and guidelines for an annual mammography	Statistical message including aggregated data of breast cancer incidences and mortality percentages/rates of women who fail to get an annual mammography	Intentions to get a mammography screening	Anecdotal < Statistical
Nan, Dahlstrom, Richards, and Rangarajan (2015)	HPV vaccination	Ad with a story about a consumer's HPV vaccination	Ad with statistical information (e.g., percentages) about HPV	Intentions to get the HPV vaccine	Anecdotal = Statistical
Nan, Futerfas, and Ma (2017)	HPV vaccination	Ad with a story about a consumer's HPV vaccination	Ad with statistical information (e.g., percentages) about HPV	Intentions to get the HPV vaccine	Anecdotal < Statistical Anecdotal = Statistical
O'Mally and Worrell (2014)	Organ donation	Fictitious scenario portraying one college student in need of a kidney transplant who died of renal disease while waiting	Message describing the current number of individuals waiting for a kidney transplant and statistics about registered organ donors	Intentions to donate organs	Anecdotal = Statistical
Peng and Huang (2019)	Flu vaccination	Story of one woman who suffered fatal consequences after getting the flu vaccination	Statistical evidence (probabilities and numbers) about consequences of the flu vaccination	Expectations of flu consequences	Anecdotal > Statistical (negative consequences) Anecdotal < Statistical (positive consequences)
Pettus and Diener (1977)	Crime	Exemplar of crime victim	Statistical information about the annual number of crime victims	Perceived seriousness of crime	Anecdotal > Statistical
Pot et al. (2019)	HPV vaccination	Personal story from an internet health forum	Statistical data (numbers and proportions) from a national institute for public health	Intentions to get the HPV vaccination	Anecdotal = Statistical
Sipes (2010)	Texting while driving	Story about an accident caused by texting while driving	Statistics (sums, annual data, and rates) about texting while driving	Perceived persuasiveness; Behavioral intentions	Anecdotal > statistical (loss frames) Anecdotal = Statistical (gain frames) Anecdotal > statistical (loss frames) Anecdotal = Statistical (gain frames)
Slater and Rouner (1996)	Alcohol use	General claims about society and subjective observations	Statistical evidence and empirical data from government agencies and scientific sources	Cognitive responses	Anecdotal = Statistical (argument-relevant statements) Anecdotal = Statistical (presentation-relevant statements)
Van Laer and De Ruyter (2010)	Childbirth	Doctor's response to a dissatisfied patient's blog	Doctor's response to a dissatisfied patient's blog post	Intentions to switch physicians	Anecdotal > Statistical (apology) Anecdotal < Statistical (denial)

Paper	Issue/topic	Anecdotal Stimuli	Statistical Stimuli	Dependent Variable	Relative Effectiveness
		post stating "I simply did a bad job with this birth, and I apologize for that"	listing detailed statistics on birth accidents ("I only followed up on 25% of the ideas listed in the plan, and I apologize for ignoring the other 75%")		
Wainberg, Kida, Piercey, and Smith (2013)	Financial audit	Detailed anecdotal information about audit deficiency	Statistical data about the inspection (percentages/ratio)	Choice between anecdotally-superior option and statistically-superior option	Anecdotal > Statistical (apology)
Weber and Martin (2006)	Organ donation	Message with a story about/conversation with an organ recipient	Statistical message reporting overall number and daily data about incidence/benefits of organ donation	Signing an organ donation card	Anecdotal = Statistical
Wieluch and Praxmarer-Carus (2016)	Smartphone usage while driving	Stimuli not provided	Stimuli not provided	Willingness to reduce risky behavior	Anecdotal = Statistical
Wieluch (2015)	Charity	Stimuli not provided	Stimuli not provided	Willingness to donate	Anecdotal = statistical (Japanese participants) Anecdotal = statistical (German participants)
Wojcieszak, Azrout, Boomgaarden, Alencar, and Sheets (2017)	Social injustices	General information and personal experiences of a Muslim woman who wears a hijab	Statistics (including percentages) about a Muslim woman wearing hijab including	Attitudes toward gender equality among Muslim women and Dutch women, sexual minority rights, and secularism	Anecdotal = Statistical
Yalch and Elmore-Yalch (1984)	Installation of ATMs	Message with general information about ATM usage in banking	Message with percentages of ATM usage in banking	Attitudes toward message advocacy	Anecdotal = Statistical (nonexpert source) Anecdotal < Statistical (expert source)
Yang et al. (2015) – Study 1A	Product evaluation (automobile insurance policy)	Story about one consumer's personal experience with the insurance company	Customer satisfaction ratings for the insurance company	Choice between anecdotally-superior option and statistically-superior option	Anecdotal > Statistical (high anxiety condition)

Paper	Issue/topic	Anecdotal Stimuli	Statistical Stimuli	Dependent Variable	Relative Effectiveness
Yang et al. (2015) – Study 1B	Medication for stomach virus	Details about one co-worker's who was afflicted with the stomach virus and took the medication	Percentage of consumers with the stomach virus who were cured after taking the medication	Choice between anecdotally-superior option and statistically-superior option	Anecdotal > Statistical (high anxiety condition)
Yang et al. (2015) – Study 2	E. Coli	Letter from one cattle farmer to a newspaper editor, discussing additional regulation in the cattle farming industry	Letter employing multiple types of numerical information supporting cattle farmers (and opposing government regulation)	Influence index	Anecdotal > Statistical (anxiety condition) Anecdotal = Statistical (sadness condition)
Yang et al. (2015) – Study 3	Medication	Details about one co-worker's who was afflicted with the stomach virus and took the medication	Percentage of consumers with the stomach virus who were cured after taking the medication	Choice between anecdotally-superior option and statistically-superior option	Anecdotal > Statistical (high risk)
Yu, Ahern, Connolly-Ahern, and Shen (2010)	FASD	Exemplar appeals vividly depicting an individual's personal experience with FASD	Statistical appeals emphasizing numbers associated with FASD	FASD prevention intentions	Anecdotal = Statistical (loss frames) Anecdotal = Statistical (gain frames)
Zhang, Chock, Chen, Wang, and Schweisberger (2011)	HIV protection via safe sex	Individual stories about HIV	Summary data about HIV	Perceived message effectiveness	Anecdotal = Statistical (low novelty condition) Anecdotal > Statistical (high novelty condition) Anecdotal = Statistical (low sex appeal condition) Anecdotal = Statistical (high sex appeal condition)

Second, in an attempt to comprehensively understand the differential impact of both evidence types, we go beyond the domains of communication, argumentation, and healthcare, and conduct a cross-disciplinary meta-analysis of *all* relevant work (including unpublished manuscripts). Consequently, our meta-analytic database is comprised of 61 papers—substantially more than any of the extant review articles on this topic. Importantly, we incorporate some studies not included in *any* of the previous reviews. We carefully examined each article in our database, recording all moderators explored. As shown in Table 2, previous researchers have examined many moderators to the relationship between evidence type and persuasion, including, but not limited to: *involvement* (high vs. low; Han & Fink, 2012), *information processing style* (rational vs. experiential; Berger, 2007), *need-for-cognition* (high vs. low; Braverman, 2008), *vividness* (high vs. low; Baesler & Burgoon, 1994), *message framing* (gain vs. loss; Gray & Harrington, 2011), *time* (immediate, 48-hour delay, 1-week delay; Baesler & Burgoon, 1994), *anxiety* (high vs. low; Yang et al., 2015), *threat severity* (high vs. low; Berger, 2007, De Wit et al., 2008, Yu et al., 2010), and *nationality/culture* (France vs. the Netherlands; Hornikx & Hoeken, 2007). Also, as shown in Table 2, the studies that compared the relative effectiveness of anecdotal vs. statistical covered a wide span of issues/topics, including weight loss, mammogram, mouthwash, speeding, vaccination for Hepatitis B virus, product failure, organ and tissue donation, theft, medication, insurance, skin cancer, alcohol use, and texting while driving.

Third, in our examination of the moderators and the issues/topics investigated in the original studies, we expect that evocation of high emotional engagement will enhance the tendency to favor anecdotal information. We refer to this as the *visceral congruency effect*—where an emotionally rich decision environment induces a feelings-based processing style favoring congruent anecdotal information more than statistical information. In line with our proposed visceral congruency effect, we further posit the contextual factors closely tied to individuals' emotional engagement will help explain why anecdotal evidence is more effective than statistical evidence in some situations, but not in others. With this in mind, our coding and analysis of moderators was guided by two criteria. First, we attempted to identify conceptual moderators that previous research associates with *emotional engagement*, which is our proposed theoretical driver for the anecdotal bias. Second, we sought variables examined in a sufficient number of studies ($N > 5$), so that proper moderation tests could be conducted. We identified three important contextual factors, which had the requisite number of studies, and were theoretically related to emotional engagement that we could subjectively but systematically code based on details provided in the original studies: (i) *threat severity* of the issue featured in each study; (ii) whether the issue is *health-related*; and, (iii) the *personal relevance* of the decision. It is worth noting that the three moderators are identified through a theoretical lens, not simply via the observation of the published studies. In fact, no existing study has offered such a conceptual explanation. We believe our proposed visceral congruency effect fills the void in the literature and brings a significant contribution to this stream of research.

In the sections that follow, we first introduce key constructs and develop hypotheses about when we expect statistical evidence to be more persuasive than anecdotal evidence, when the opposite occurs, and why. Next, we describe the meta-analytic procedures employed to test these hypotheses and report results. We conclude with a discussion of key findings and takeaways that inform persuasion theory and marketing practice.

1. Theoretical development

Perhaps because of the frequent use of evidence in persuasive messaging, a welter of academic studies has compared the effects of statistical versus anecdotal evidence. *Evidence* is variously referred to as “factual statements originating from a source other than the speaker, objects not created by the speaker, and opinions of persons other than the speaker that are offered in support of the speaker’s claims” (McCroskey, 1969, p. 171), “information regarded as proof by a source” (Reinard, 1988), and “data (facts or opinions) presented as proof for an assertion” (Reynolds & Reynolds, 2002, p. 429). While the semantics of these definitions vary slightly, researchers in this area agree that (1) the purpose of evidence is to convince the message recipient to accept the conclusions of the communicator (Allen & Preiss, 1997), and, (2) there are two broad types of evidence—namely anecdotal evidence and statistical evidence (Baesler & Burgoon, 1994). As with the information on hiring practices at the accounting firm featured in the opening example, anecdotes typically emphasize individuating information, such as a first-person account of a workplace peer who faced the same challenges encountered by the new hiring manager. The scenario also illustrates how an industry report providing statistical information relies on aggregated, generalizable, factual assertions and abstract data. While anecdotal evidence may be more persuasive because it weaves a compelling story about a setting, an event, or an issue from the perspective of a particular individual and involves “information about goals, plans, actions, and outcomes” (Kopfman, Smith, Yun, & Hodges, 1998), statistical evidence may convey greater objectivity because it derives from the experiences of multiple individuals and can be generalized across a population (Allen & Preiss, 1997).

As indicated earlier, empirical work in this area has not produced a definitive conclusion about which type of evidence is most persuasive; however, it is not for lack of trying. While some researchers (Winterbottom et al., 2008) find that anecdotal evidence is more effective than statistical evidence, other researchers (Allen and Preiss, 1997, Hornikx, 2005a) show that statistical evidence has a greater persuasive impact than anecdotal evidence. Still others find no difference in the effectiveness of persuasion across these two types of evidence (Baesler & Burgoon, 1994). In this research, we attempt to reconcile these contradictory findings and explore important boundary conditions to the relationship between evidence type and persuasion.

Anecdotal evidence is often emphasized in decision making because personal stories are more vivid, concrete, and easier to process than pallid statistics that require greater effort to understand (Baesler, 1997, Hamill et al., 1980, Kazoleas, 1993). In comparison to statistical evidence, anecdotal evidence is more emotionally interesting, involving, and compelling (Cox & Cox, 2001), and often enables respondents to vicariously experience or re-live an event (Leiserowitz, 2006)—which may prolong retention and increase its availability as a cue during decision making (Reisberg & Heuer, 2004). However, statistical evidence—which is based on a larger sample—is typically more informative than anecdotal evidence—which is based on a single case that could be used to support any assertion. Thus, relative to anecdotes, statistics are thought to possess greater diagnosticity and reliability in decision making (Raghubir & Menon, 1996). *Ceteris paribus*, most people generally seem to concur with this maxim—a finding we validated in a pilot study conducted with a small sample. In this pilot study, we explained the meaning of statistical and anecdotal evidence and provided illustrative examples.² When participants were asked to make a binary choice between which type of information they would

prefer to use in most decision making scenarios, over 74% preferred statistical evidence ($n = 54$, binomial test: $z = 3.40$, $p < .001$). Based on this pilot study and the foregoing discussion, we predict that:

H1. In general, statistical evidence is more persuasive than anecdotal information.

1.1. Visceral congruency effect

While H_1 suggests that statistical evidence is more influential, many—if not most—persuasive messages feature anecdotal information, not statistical evidence. To illustrate, in a recent content analysis of almost 29,000 argumentative editorials about a variety of topics in the *New York Times*, Al-Khatib, Wachsmuth, Hagen, and Stein (2017) report that narrative appeals were ten times more likely to be employed than statistics. This suggests that individuals crafting persuasive messages believe anecdotal information is more effective among audience members than statistical evidence. Correspondingly, extensive evidence shows that people are often influenced more by anecdotes than by aggregate statistical evidence. For example, individuals, even subject experts, have been found to be influenced by methodologically flawed anecdotal evidence in legal and organizational settings (Kovera & McAuliff, 2000). This may be a consequence of anecdotal information being more vivid, and emotionally engaging than comparable statistical information (Baesler, 1997, Cox and Cox, 2001). It is also easier to process than pallid statistics which require greater effort to understand (Hamill et al., 1980, Kazoleas, 1993). In the context of competing anecdotal vs. statistical evidence, this would imply greater reliance on anecdotal (vs. statistical) information in situations where appraisals are more affective.

It may not just be the nature of information—statistical or anecdotal—which influences a person's reliance on anecdotal cues. The decision-making context may also affect this process. Certain contexts may facilitate greater dependence on feeling-based pathways which may favor the use of anecdotal over statistical information. It is often the case that affective influence is greater when emotional engagement is high—like in high-threat or mortality-related decisions (Bar-Anan et al., 2009, Power et al., 2011). We refer to the tendency to favor anecdotal information in such high emotional engagement states as the *visceral congruency effect*—where an emotionally rich decision environment evokes a feelings-based processing style favoring congruent anecdotal information more than statistical information.

1.2. Contextual factors enhancing the visceral congruency effect

Our proposed visceral congruency effect can be viewed as a result of the greater vividness and ease-of-processing associated with anecdotal (vs. statistical) evidence. Specifically, anecdotal biases have largely been attributed to the greater vividness and ease-of-processing that characterizes stories, as compared to statistical forms of data—which tend to be more pallid and require more cognitive effort to process (Baesler, 1997, Hamill et al., 1980, Kazoleas, 1993). Subjectively, anecdotal information often evokes more interest and involvement among audience members (Cox & Cox, 2001). The vividness and affective richness of an anecdote can prolong retention (Reisberg & Heuer, 2004) and increase its availability as a cue during decision making, potentially leading to suboptimal decisions (De Wit et al., 2008, Keller and Block, 1997). As a

result, strong affective states have the potential to influence decision-making through a feelings-based pathway (Gladwin and Figner, 2015, Van den Bos, 2007). Such pathways are likely to be activated when people are more emotionally engaged in a decision (Bar-Anan et al., 2009, Power et al., 2011), thereby leading to states of hot cognition (Van den Bos, 2007). Consistent with this reasoning, we propose a *visceral congruence* framework to understand when consumers will favor anecdotal or statistical information. We posit that contextual factors enhancing individuals' emotional engagement in decision making are likely to increase their reliance on anecdotal evidence. In our meta-analysis, we identified the following conceptual moderators: (i) *threat severity*; (ii) *personal relevance*; and, (iii) nature of the issue (i.e., *health-related* or not).

Threat Severity. Decisions involving enhanced threat severity elevate arousal and negative affect (Bar-Anan et al., 2009), especially when the cost of making a poor decision is high and the decision maker experiences fear and vulnerability. In such situations, people are likely to be highly emotionally engaged. Consistent with our reasoning, previous research suggests that affective states associated with high levels of autonomic arousal can impair working memory capacity and executive functioning (Hartley & Phelps, 2012). So even when an individual is more emotionally engaged in a situation, s/he may, in fact, become less cognitively involved (Liberman & Chaiken, 1992). Along similar lines, the extended parallel processing model (Witte, 1992) proposes that exposure to severe threats may activate coping mechanisms, such as reliance on affective cues (Bar-Anan et al., 2009, Faraji-Rad and Pham, 2017).

Personal Relevance. Individuals make choices not just for themselves but also for others. Making a decision for oneself, versus for another person, may result in differences in emotional engagement. In line with our reasoning, past literature exploring self-other differences in decision-making suggests that individuals choose differently for others than they do for themselves, primarily because decisions for others are less affective-laden. This leads to reduced loss aversion (Polman, 2012) and lower susceptibility to the omission bias (Zikmund-Fisher, Sarr, Fagerlin, & Ubel, 2006) in decisions for others. For instance, Wagenaar and Keren (1986) demonstrated that, on the issue of seat belt compliance for children, parents were more likely to be swayed by anecdotal evidence; however, policy makers were influenced more by statistical evidence. This may be because parents' high personal relevance to the issue of their child's safety has heightened their emotional engagement, thereby enhancing their susceptibility to the anecdotal bias. Similarly, demographic groups highly vulnerable to breast cancer mortality have been shown to be more persuaded about the benefits of mammography by singular narratives than by aggregate statistics (Kreuter et al., 2007). Overall, emotional involvement seems to be strongly associated with personal involvement in a decision.

Health-Related Decisions. Health-related situations, especially those involving potentially life-threatening conditions, are often accompanied by affective responses such as anxiety, stress, and existential concerns (Holland, 2003, Power et al., 2011). Decisions made in these situations commonly involve exceptional levels of uncertainty and fear, which are likely to trigger more affectively-influenced responses (Bar-Anan et al., 2009). Such stress and anxiety experienced during crucial health-related decisions can significantly enhance emotional engagement (Kaplan & Frosch, 2005). For instance, Kahn and Luce (2003) have demonstrated that mammography-related decisions are often plagued by emotion-induced considerations, leading to suboptimal decisions.

In sum, we posit that when an issue involves a severe threat, pertains to oneself, or relates to health, that decision is likely to induce stronger emotional engagement, leading to greater reliance on anecdotal (vs. statistical) information. Therefore, we offer the following predictions:

H2. Threat severity moderates the influence of evidence type on persuasion such that the influence of statistical (vs. anecdotal) information diminishes when threat severity is high, as compared to when it is low.

H3. Personal relevance moderates the influence of evidence type on persuasion such that the influence of statistical (vs. anecdotal) information diminishes when the decision is made for oneself, as compared to when it is made for others.

H4. A health-related (vs. non health-related) context moderates the influence of evidence type on persuasion such that the influence of statistical (vs. anecdotal) information diminishes when the issue is health-related, as compared to when it is not.

2. Database development

We identified relevant empirical work using various methods. First, we searched for published articles on JSTOR, EBSCOhost, Emerald, and Google Scholar, and for unpublished papers and dissertations on SSRN Elsevier and ProQuest Digital Dissertations. Our search spanned 42 years (1977–2019) and included several keywords such as *testimonial message*, *narrative message*, *qualitative message*, *base evidence*, *statistic evidence*, *quantitative message*, *numerical message*, and *arithmetic message*. Among the papers located this way, we identified seminal articles comparing anecdotal and statistical messages (Hoeken and Hustinx, 2009, Hornikx and Hoeken, 2007) and reviews (Reinhart, 2006); the references of these papers were reviewed for additional papers to be included into our meta-analytic database. We also reviewed two related meta-analyses that are more limited in scope (Allen and Preiss, 1997, Zebregs et al., 2015)³ and identified additional papers by examining the references of these articles. To enhance the exhaustiveness of our search, we also posted a call for unpublished studies on academic forums such as ELMAR, which are popular among marketing researchers.

Through these means, we located a total of 216 papers, which we then evaluated in terms of their relevance to our specific research focus. Studies were deemed eligible if they: (1) focused on the relationship between evidence type and persuasion; and, (2) contained empirics that allowed us to calculate a common effect size (Glass et al., 1981, Janiszewski et al., 2003). Since we sought to assess the relative persuasiveness of anecdotal evidence versus statistical evidence, we excluded papers that did not compare the effectiveness of anecdotal messages to statistical messages. Further, we did not include papers comparing different versions of statistical messages or anecdotal messages (Keller and Block, 1997, Koehler, 2001, Parrott et al., 2005). In addition, we eliminated six papers (Allen et al., 2000, Betsch et al., 2011, Boster et al., 2000, Good, 2010, Nettelhorst et al., 2013, Yan and Sengupta, 2013) that compared messages with a combination of anecdotal and statistical information to messages with only anecdotal or statistical evidence. Otherwise relevant non-empirical papers (Dawes, Faust, & Meehl, 1989) and qualitative papers (Denberg, Melhado, & Steiner, 2006) were also excluded. Ultimately, 61

papers (including 50 published articles and 11 unpublished manuscripts) met our criteria and were included in our meta-analytic database. On average, each paper contains 2.62 studies, yielding a total of 160 effect sizes.

2.1. Coding procedures

Two of the authors coded the means, standard deviations, and sample sizes of both the anecdotal and the statistical conditions for each observation to calculate Hedges's g —also known as the correction for Cohen's d (Lakens, 2013). The difference between these two metrics lies in the way the standard deviation is calculated (Fern & Monroe, 1996). As explained by Hedges and Olkin (1985), Cohen's d generates a biased estimate of the population effect size. For that reason, they suggest the use of Hedges's g as a more conservative and robust estimation method. Consistent with Zebregs et al. (2015) prior meta-analysis of evidence type, we initially grouped the outcome measure of each study in our meta-analysis into one of three categories (i.e., beliefs, attitudes, or intentions) so that we could assess the impact of dependent variable as a moderator in our model. Because there was no significant difference in the pattern of results across these three dependent variables, we elected to combine them into one outcome measure—persuasion. To this we added nine observations that assessed behaviors, which were not included in Zebregs et al. (2015) meta-analysis. When a study reported statistics for multiple outcomes (i.e., dependent variables), the effect sizes were averaged together to avoid inflation of that study's sample size (Cheung & Chan, 2008). Furthermore, to account for the relatedness among effect sizes, we employed the adjusted-weighted procedure to calculate the adjusted sample size (Braverman, 2008, Cheung and Chan, 2004), which was then used as the sample weight for the sample-weighted average effect size.

In addition to capturing the effect size for each observation, we developed a coding scheme that enabled us to examine several potential sources of variation in the effect of message type on persuasion. Some of these variables are methodological in nature and pertained to the sample (e.g., whether or not the sample was comprised of students, included both genders, and was drawn in the U.S.) and the research outlet (i.e., whether or not the study appeared in a published paper, and was in the Marketing domain). Theoretical factors pertinent to our research hypotheses were also independently coded by two co-authors.⁴ Given that methodological factors are less theoretically interesting or practically important, we treated these factors as control variables in the meta-analysis when we ran the meta-regression (Lynch, 1982, Peterson, 2001) and focus our discussion around the substantive theoretical moderators featured in our hypotheses (i.e., whether or not the message issue was associated with severe consequences, self-relevant, or health-related).

2.2. Results

Main Effects. In the following section we present the meta-analytic results for the overall effect of evidence type on message persuasion. As shown in table 3, the mean Hedges's g across the studies in our database is 0.066 ($p < .01$), which is a small (Rosnow & Rosenthal, 2008) but significant effect—as indicated by the 95% bootstrapped confidence interval around the mean ($CI_{BS} = 0.039$ to 0.093). This result suggests that, in support of Hypothesis 1, statistical evidence

in general is significantly more persuasive than anecdotal evidence. Appendix A presents an overview of the data using a forest plot.

Table 3. Main Effect Results for the Evidence Type-Persuasion Relationship.

	Number of samples (<i>k</i>)	Number of observations (N)	Weighted Hedges's <i>g</i>	Standard error	95% Confidence Interval (<i>CI_{BS}</i>)	Unaccounted variance (χ^2)	Fail-safe sample size (<i>N_{FS}</i>)
Persuasion	160	32,321	0.066***	0.014	[0.039 to 0.093]	2,527.26	5027

*** $p < .01$.

Rosenthal's fail-safe sample size ($N_{FS} = 5027$) indicates that these results are robust, and that publication bias is not likely to be a problem. A funnel plot of all effect sizes plotted against their respective precision metric also confirms that there is no publication bias in the form of a file drawer problem, as shown in Appendix B.

Moderating Effects. Our main effect results demonstrate that individuals generally weigh statistical information more than anecdotal information in decision making; however, there is substantial heterogeneity in the evidence type–persuasion relationship ($\chi^2 = 2,527.26$, $p < .01$). This finding warrants an examination of key moderators to the relationship between evidence type and message persuasion. The moderation analysis was performed through meta-regression analysis using the CMA 3.0 software, with Hedges's *g* as the common effect size metric. All theoretical and methodological factors were included as independent variables in the model, with persuasion as the dependent variable. Consistent with our expectations, the meta-regression analysis shows that the moderating effects of all theoretical factors were significant (threat severity: $g = -0.12$, $p < .01$; whether the decision is for oneself versus for others: $g = -0.16$, $p < .01$; whether the decision is health-related or not: $g = -0.11$, $p < .01$; see Table 4).

Table 4. Moderator Estimates in the Meta-Regression.

Factor	Persuasion
Threat Severity associated with the issue	-0.12***
Personal Relevance	-0.16***
Nature of the Issue (health vs. non-health)	-0.11***
Sample Composition	0.06
Sample Gender	0.04
Sample Geography	-0.01
Publication Status	0.23***
Publication Domain (Marketing or other)	0.02

*** $p < .01$.

Post-hoc univariate analyses were conducted to test our remaining hypotheses, and are presented in Table 5. Hypothesis 2 specifies that the influence of statistical (vs. anecdotal) evidence diminishes when threat severity is high as compared to when it is low. Consistent with this hypothesis, statistical evidence is significantly less persuasive than anecdotal evidence when the issue is associated with high threat severity ($g = -0.061$, $p < .01$) versus when it is associated with low threat severity ($g = 0.157$, $p < .01$; $\chi^2(1) = 62.07$, $p < .01$). Further, in support of Hypothesis 3—which predicts that the influence of statistical (vs. anecdotal) evidence diminishes when the decision is made for oneself as compared to when it is made for others—statistical evidence is significantly less persuasive for personally relevant issues ($g = -0.032$, $p < .1$) than

for issues affecting another person ($g = 0.175, p < .01; \chi^2(1) = 57.48, p < .01$). Finally, Hypothesis 4 predicts that the influence of statistical (vs. anecdotal) evidence diminishes when the issue is health-related as compared to when it is not. As expected, statistical evidence is significantly less persuasive than anecdotal evidence when the issue being evaluated relates to health ($g = -0.059, p < .01$), as compared to when it does not relate to health ($g = 0.143, p < .01; \chi^2(1) = 51.65, p < .01$). Taken together, these results indicate that the three theoretical factors we proposed (i.e., threat severity, personal relevance, and health-related) are important boundary conditions to the evidence type–persuasion relationship.

Table 5. Weighted Univariate Results for Moderators.

	Number of samples	Number of observations	Mean effect	Std error
<i>Threat Severity (H2)</i>				
High	90	17,716	-0.061***	0.021
Low	70	14,605	0.157***	0.018
<i>Personal Relevance (H3)</i>				
Self	112	21,749	-0.032*	0.019
Others	48	10,572	0.175***	0.020
<i>Nature of the Issue (H4)</i>				
Health-related	86	17,528	-0.059***	0.022
Non health-related	74	14,793	0.143***	0.017
<i>Sample Composition</i>				
Student	103	22,785	0.083***	0.017
Non-student	57	9,536	0.033	0.024
<i>Sample Gender</i>				
Both genders	135	29,354	0.081***	0.014
Single	25	2,967	-0.047	0.040
<i>Sample Geography</i>				
U.S.	119	23,329	0.051***	0.017
Non-U.S.	41	8,992	0.093***	0.022
<i>Publication Status</i>				
Published	129	26,724	0.091***	0.015
Non-published	31	5,597	-0.025	0.029
<i>Publication Domain</i>				
Marketing	29	4,739	0.105***	0.038
Non-marketing	131	27,582	0.06***	0.015

** $p < .05$.

* $p < .1$.

*** $p < .01$.

Inconsistencies across correlations for the evidence type–persuasion relationship can also be explained by differences in publication status ($g = 0.23, p < .01$). Our analyses reveal that published studies show greater persuasion for statistical evidence ($g = 0.091, p < .01$), while unpublished studies reveal a nonsignificant persuasion effect for anecdotal evidence ($g = -0.025, n.s.; \chi^2(1) = 12.36, p < .01$). None of the other methodological factors included in our moderator analysis reached statistical significance. Specifically, sample composition, sample gender, publication domain, and sample geography did not significantly moderate the relationship between evidence type and persuasion (all p 's > 0.05), indicating that the relative persuasiveness of statistical versus anecdotal evidence is not systematically affected by sample

composition (i.e., students vs. non-students and mixed vs. single genders), research domain (i.e., Marketing vs. other), or geography (i.e., U.S. or other).

3. Discussion

This manuscript presents a meta-analysis examining the relative influence of anecdotal information versus statistical information on persuasion. Results indicate that individuals generally rely more on statistical information than on anecdotal information. However, this tendency is not absolute. Situational factors that enhance emotional engagement are shown to decrease reliance on statistical evidence and lead individuals to focus more on anecdotal information. Specifically, when the decision is health-related, is personally relevant, or involves severe consequences, individuals weigh anecdotal evidence more heavily than statistical evidence—exhibiting an anecdotal bias.

3.1. Theoretical contributions

Our research represents a comprehensive, interdisciplinary effort to reconcile mixed findings in the literature on the relative persuasiveness of statistical versus anecdotal information. Some researchers show that statistical evidence is more influential than anecdotal information (Allen and Preiss, 1997, Hornikx, 2005a); however, other scholars report the opposite pattern of results (c.f., Winterbottom et al., 2008). The present research suggests that the relative persuasiveness of statistical evidence depends upon whether the decision induces strong emotional engagement—as with health-related situations where making a wrong decision may be associated with severe consequences. Under circumstances that evoke stronger emotional engagement, individuals are more likely to emphasize anecdotal (vs. statistical) evidence in decision-making.

Previous research in the area of emotional decision-making supports this conclusion, and shows that individuals under conditions of greater emotional difficulty often resort to alternate decision strategies (Luce, Payne, & Bettman, 1999). For instance, Luce (1998) demonstrates consumers in more affective situations opt for avoidant choice strategies. Along similar lines, our findings establish that—under conditions of greater emotional engagement—individuals rely more on anecdotal (vs. statistical) evidence in their decision-making.

Interestingly, our findings illuminate how personal relevance influences decisions. Generally, it is expected that individuals will display greater rationality and discernment for self-relevant decisions. However, emerging evidence indicates that this may not always be true. Individuals often display greater rationality and make less biased decisions when choosing for others (Andersson et al., 2014, Gershoff and Koehler, 2011), engaging in more elaborate processing and more extensive information search for other-relevant decisions (Liu, Polman, Liu, & Jiao, 2018). We assert that this may be a result of greater emotional engagement when people are deciding for themselves, and less emotional engagement when people are making choices for others. Such emotional disruption is significantly reduced in other-relevant decisions, leading to decisions based on statistics instead of stories.

3.2. Managerial implications

Our findings suggest that, for important decisions that do not induce strong emotional engagement, individuals rely more on statistical (vs. anecdotal) information in their decisions. These findings elucidate why statistical evidence is more persuasive with policy makers on the issue related to seat belt compliance for children, whereas anecdotal evidence is more likely to persuade parents. Armed with this information, marketers should use aggregated, generalizable, factual assertions and abstract data to persuade decision makers in such situations.

These findings also suggest that managers might enhance the effectiveness of advertising by capitalizing on the effects of situationally heightened emotional engagement. Emotional engagement can be primed—often subconsciously—by a variety of external stimuli such as communication appeals (Yang et al., 2015). For ads containing anecdotal appeals, marketers should strive to intensify consumers' emotional engagement. In contrast, when an advertisement features statistical facts, marketers may increase the effectiveness of such a message by downplaying the severity of consequences to reduce consumers' emotional engagement.

Findings reported here also shed light on the persuasiveness of narrative and testimonial-based messages in health communication (Kreuter et al., 2007). Health and medical decisions often involve high stakes, and people are expected to display judiciousness by giving due regard to relevant statistics and information. But these expectations are often not borne out. A case in point is the growing belief that vaccinations may be injurious to children, despite the preponderance of statistical evidence repudiating this claim (Hotez, 2016). Another interesting study demonstrates that parents are particularly susceptible to the anecdotal bias when selecting car seats for their children (Wagenaar & Keren, 1986). Our findings suggest that this may be a result of high emotional engagement prompted by high perceived risk among parents that accompany most health and child-safety decisions.

3.3. Limitations and future research

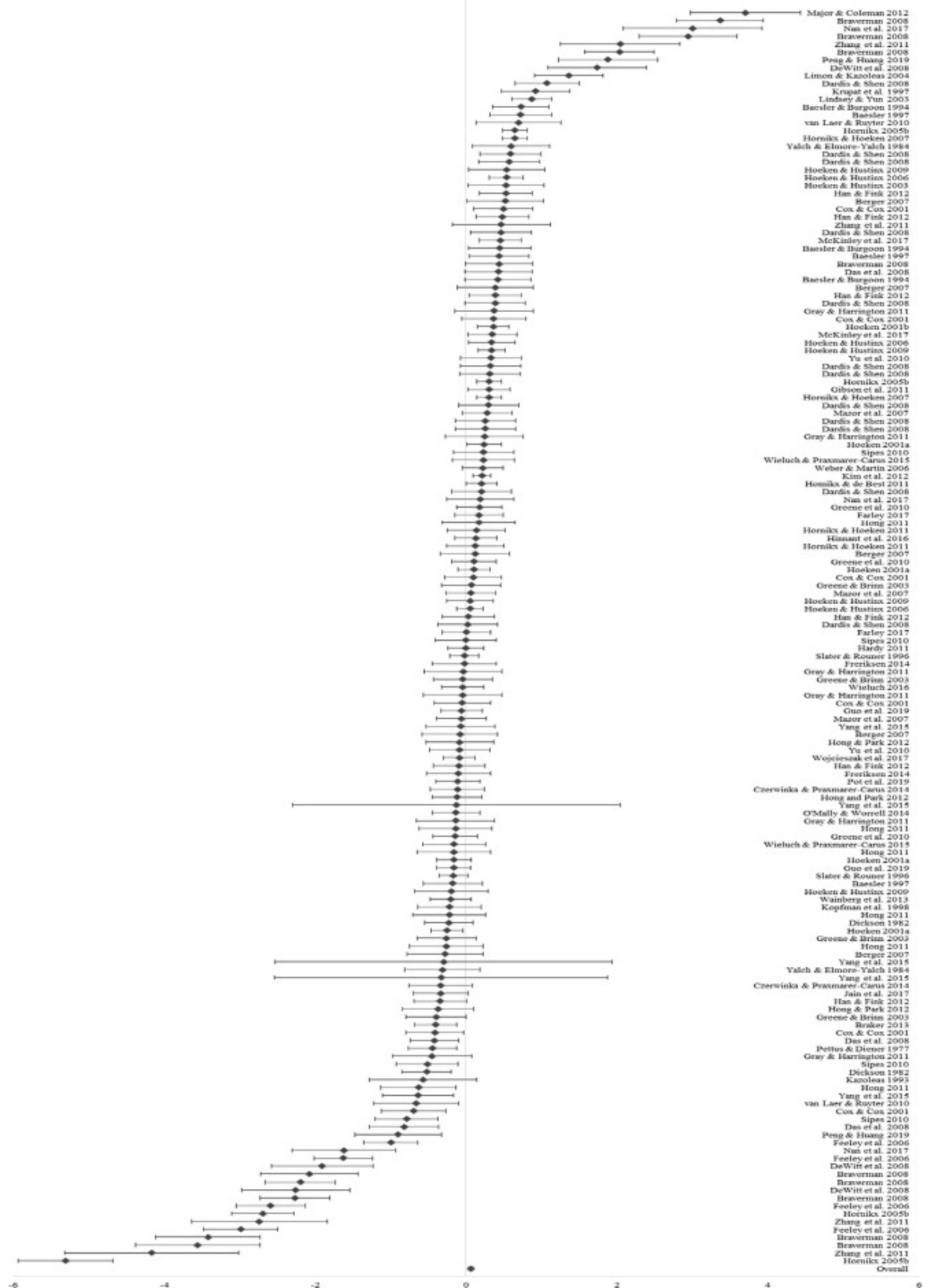
Our results are subject to the innate limitations of the meta-analytic technique. First, as with any meta-analysis, in spite of our best efforts, we could not include all studies and constructs featured in the literature because of a lack of information necessary for the calculation of effect sizes. We were constrained by the data available in the original studies that we were able to obtain, and in some cases, we did not have access to the information needed to transform empirical results into a usable metric for inclusion in our analysis. Second, while several other variables would be of interest as potential moderators, we limited our focus to characteristics that could be systematically coded in all of the original studies. Thus, our work should be considered a summary of commonly studied variables in the extant literature on evidence type, rather than an exhaustive compendium of moderators and theoretical mechanisms. Third, because the studies comprising our meta-analytic dataset are correlational, causal interpretations should be made with caution. Although the present meta-analysis reveals three theoretical moderators to the relationship between evidence type and persuasion, we cannot definitively address *why* these effects occurred. Future research could build on our meta-analysis and provide a deeper understanding of individuals' relative reliance on statistical vs. anecdotal evidence and boundary conditions to this relationship by explicitly manipulating these and other variables to examine their impact on the evidence type–persuasion relationship. Using controlled experiments,

researchers can also establish the underlying mechanism to explain exactly how and why greater emotional engagement enhances the anecdotal bias.

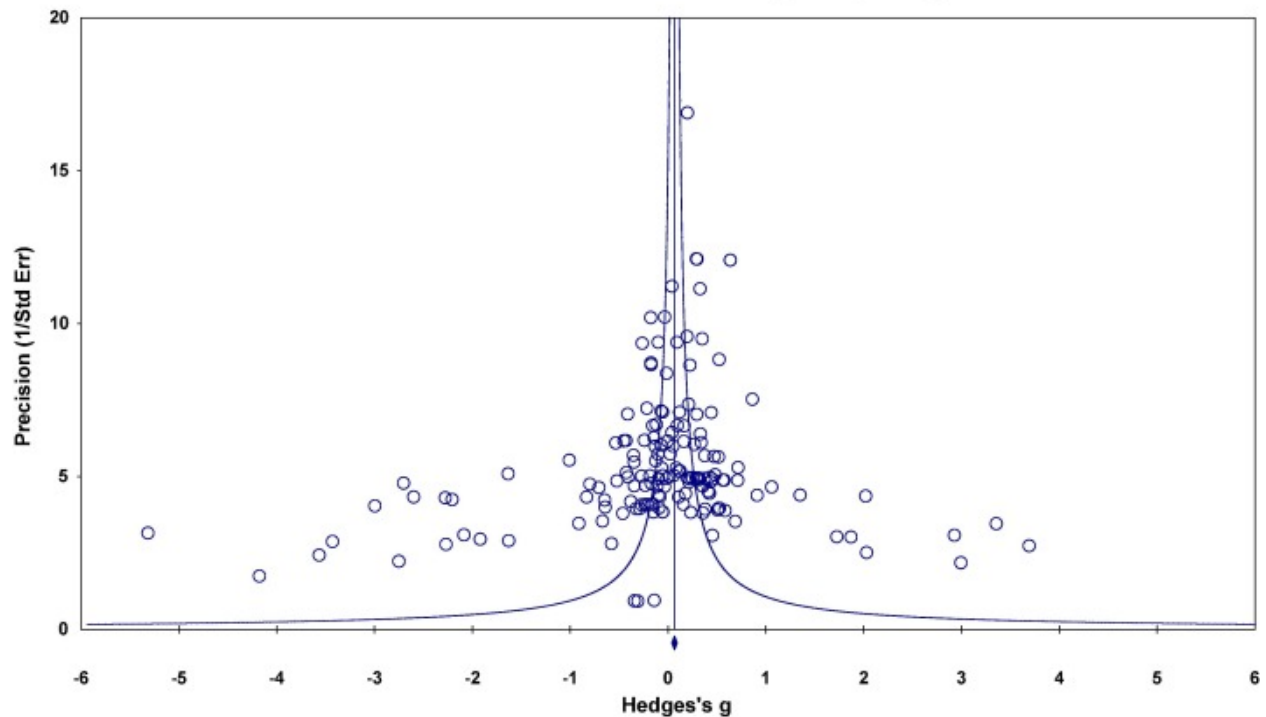
Another interesting question left unanswered in this meta-analysis is whether incidental cues, and not just integral ones, can also induce the anecdotal bias. Studies in our meta-analysis examine integral cues that enhance emotional engagement. But previous research, mainly in the area of affective influences, demonstrates how even incidental emotions can simulate the effect of integral emotions on decision making and perception (Achar, So, Agrawal, & Duhachek, 2016). It is likely that even incidental affective influences that enhance emotional engagement may trigger the anecdotal bias.

Finally, although other behavioral and perceptual biases like availability and representativeness, including base-rate neglect (Locksley et al., 1982, Sloman et al., 2003), can be viewed as manifestations of consumers' insensitivity to statistical information in the presence of more visceral and vivid cues, we distinguish work in that area from the current research, where we focus solely on persuasion-based contexts. Our domain specification is consistent with earlier meta-analyses on evidence type (Allen and Preiss, 1997, Zebregs et al., 2015), and enabled us to meaningfully compare our findings to those of previously published meta-analyses. That said, it may be fruitful for future researchers to examine if our findings also extend to other such "anecdote-favoring" heuristics, including base rate fallacy and representativeness heuristic.

Appendix A. Forest plot of effects of evidence type on persuasion



Appendix B. Funnel plot of all observed effects for evidence type on persuasion Funnel Plot of Precision by Hedges's g



Appendix C. Supplementary material

Supplementary data to this article can be found online at
<https://doi.org/10.1016/j.obhdp.2020.01.006>.

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