12-2014

The (Un) Desirability of Happiness: Pathogen Threats Predict Differences in the Value of Happiness

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by
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Submitted to the School of Social Sciences in partial fulfillment of the requirements of the Degree of Doctor of Philosophy in Psychology

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2014

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Abstract

People in some parts of the world find positive emotions more desirable than others. What accounts for this variability? We predicted that happiness would be valued less under conditions where the behaviors that happiness promotes would be less beneficial. We analyzed international survey data and United Nations voting records and found that happiness was valued relatively less in environments that had been historically pathogen-rich. Using a series of experimental studies, we showed that people who were experimentally primed by the threat of pathogens judged happiness in others less favorably and found happiness less appropriate. Our findings contribute to research on the function of positive emotions by providing insight into the boundary conditions under which happiness is deemed desirable.

Keywords: Emotion, culture, pathogen threats, happiness

TABLE OF CONTENTS

ACKNOWLEDGEMENTS

To my advisor, Christie, and to my dissertation committee members, Norm, Grace & Nick: Sincere thanks for all of your help and guidance through this project. Your comments and encouragement helped shaped this dissertation and made it better. I am very grateful for all the time and thought that each of you invested in this project,

INTRODUCTION

Is happiness always a good thing? Dozen of studies have shown that compared to their unhappy counterparts, happy people earn more money (Diener & Biswas-Diener, 2002), have more satisfying marriages and friendships (Cooper, Okamura & Gurka, 1992; Ruvolo, 1998) and even have better health and live longer (Diener & Chan, 2011; Pressman & Cohen, 2005). One reason for their success is that others often judge happy people as more likable and make decisions that benefit them such as evaluating their performance more positively and hiring and promoting them (Burger & Caldwell, 2000; Cropanzano & Wright, 2001; Harker & Keltner, 2001). Happy people also do better in interpersonal relationships – they enjoy more social support and acceptance (Salovey, Rothman, Detweiler & Steward, 2000) and have more social influence (Cialdini, 1984).

Despite these documented personal and social benefits, there is wide cultural diversity in how much people value positive affect. In some cultures, a good life is one that is filled with high levels of life satisfaction, while in others, satisfaction is deemed as less important. Joshanloo and Weijers (2014) observed that Western contemporary research on happiness over emphasized personal happiness as a universal good, however there is strong evidence that in some cultures, an aversion to happiness exists, for example driven by a fear that being happy would make it more likely that bad things would happen to you. According to an international study of 41 countries, the standard deviation in ideal life satisfaction was .76 points on a 10-point scale of happiness (Diener, Scollon, Oishi, Dzokoto & Suh, 2000). In absolute terms, this is not trivial. Further, in some cultures, feelings of excitement are viewed as less desirable (Tsai, Knutson & Fung, 2006). Indeed, comparisons of people from

different cultures faced with the same decision reveal that people from some cultures are more inclined to choose to forgo happiness than others (Oishi & Diener, 2003).

The reason for these cultural differences in the desirability of happiness was the focus of our research. To better understand the cause of these differences, we began by examining the types of behaviors and inclinations that were triggered by positive emotions and we then constructed a set of conditions under which it would not be beneficial to be happy. Next, we tested whether happiness was less desirable under these unfavorable conditions using international survey data and voting records and found support for our predictions. Finally, we conducted a series of experimental studies that showed that priming these unfavorable conditions led to happiness in others being judged less favorably and happiness in general to be deemed as less appropriate.

Differences in the Desirability of Happiness [1]

Not all cultures experience high levels of happiness. Numerous global surveys have repeatedly documented large international differences in happiness levels. For example, when asked to rate how satisfied they were with their lives as a whole on a 10 point scale (where 1 = dissatisfied; 10 = satisfied), people from Tanzania and Zimbabwe averaged scores below 4, while people from Switzerland, Puerto Rico and Colombia averaged scores that were more than double that (above 8) on the same scale (World Value Survey Association, 2008).

But why do these differences in happiness levels exist? For many, the explanation that readily comes to mind is that objective economic circumstances and

[1] The focus of this project is on general subjective well-being, which includes what lay people call happiness, life satisfaction, and positive emotions (Diener, Oishi & Lucas, 2003) and we use these terms interchangeably in our analysis.

social factors, including income, societal equality and human rights, differ between these countries. Indeed, research does generally support these explanations. Factors such as higher Gross Domestic Product and greater endorsement of certain values such as individualism, have been found to correlate with higher happiness levels (Diener, Diener & Diener, 1995; Diener et al., 2003; Diener & Suh, 1999).

Another offered explanation for cultural differences in the mean levels of happiness are cultural norms or beliefs about the desirability of happiness (Diener et al., 2000). With regard to positive emotions, in some cultures, people agree that they are expected to feel happy, while in other cultures, the imperative to value happiness is less clear (Eid & Diener, 2001). For example, one study found that people from China averaged a score of only 3.96 when asked to rate the extent to which happiness was ideal (1 = not at all; 7 = very much so), while people from Spain, Colombia and Australia averaged scores that were much higher on the same question (6.20 and above) (Diener et al., 2000). Indeed, positive emotions have been found to be highly valued only in some cultures and this has been linked to higher levels of reported life satisfaction in these cultures (Bastian, Kuppens, Roover & Diener, 2014). Research suggests that people may remember feeling emotions that are more in line with perceived norms than what they might have actually have experienced in real time (Scollon, Howard, Caldwell & Ito, 2009).

But what then accounts for this variability in cultural norms for happiness? We propose that to understand how desirable happiness is to a person; one must first examine the environmental conditions that the person finds himself in. For example, being forgiving, kind and optimistic was found to be useful among spouses in healthy marriages, while for those in troubled marriages, these same inclinations predicted worse real world outcomes (McNulty & Fincham, 2012). In other words, context

impacts whether the same behaviors reap positive benefits or not. Specifically, we propose that happiness will be judged favorably or valued in conditions where the benefits of behaviors that happiness promotes can be realized. Conversely, happiness should be judged less favorably in environments where these behaviors are less beneficial.

To understand this argument, we need to first examine the purported general benefits of happiness (Lyubomirsky, King & Diener, 2005). Positive emotions are thought to serve as a signal that all is going well and that there is time and capacity for resource building and exploration (Elliot & Thrash, 2001; Lyubomirsky, 2001). Numerous studies have found that positive emotions prime behavioral approach goals and lead people to want to engage with their environments and explore novel situations and seek out others (Diener & Fujita, 1995; Gray, 1994). Fredrickson captures these qualities in her "broaden and build" model that emphasizes that positive emotions cause people to expand their thoughts and actions and build on their skills and personal resources through activities like play and exploration (Fredrickson, 1998, 2001). The function of positive emotions may explain why the default for most human beings is not to feel neutral, but rather slightly happy (Diener, Scollon, Lucas, 2004). Against this backdrop of the benefits of positive emotions, positive affect has indeed been documented across numerous studies to lead to a person being judged well in domains as diverse as work performance, likability, leadership, social skills, attractiveness and even, moral goodness (Diener & Fujita, 1995; King & Napa, 1998; Schimmack, Oishi, Furr & Funder, 2004). In fact, we could find only one study that examined the possible interpersonal costs of expressing positive emotions that showed that overly expressive winners were judged as lacking humility (Kalokerinos, Greenaway, Pedder & Margetts, 2014).

While the behaviors and inclinations that happiness promotes might seem universally appealing at first glance, we propose that in order to reap these benefits, one must be in the right environment where these behaviors and inclinations are useful. Said differently, we propose that happiness is much more beneficial in environments where broaden and build type behaviors that are triggered by happiness are an advantage. For example, wanting to explore new options and being more sociable might prove largely beneficial in safe environments, in that people with these inclinations would be exposed to more opportunities to discover new solutions to problems and to expand their social support network or potential pool of mates. However, in a harsh environment with high levels of external threats, the same desires to explore new places and meet new people would potentially increase a person's exposure to possible harm. In addition, the drive to innovate or deviate from norms would come with more obvious costs if for example these norms capture protective wisdom on how to avoid threats in a harsh environment (e.g. norms on how to scan an area for potential attackers).

Instrumental Approach to Emotion Regulation

A central tenet of our argument is that the utility or value of happiness changes in different situations. This focus on context-specific utility is consistent with the instrumental approach to emotion regulation. The instrumental approach proposes that people can be motivated to forgo feeling good in favor of less pleasant emotions if these emotions promote goal attainment (Tamir, 2009). According to the instrumental approach, people seek out emotions that are consistent with their goals, for example choosing to feel angry to prepare for a confrontation (Tamir, Mitchell & Gross, 2008) or fear to prepare to avoid threats (Tamir & Ford, 2009). The instrumental approach

predicts that pleasure is balanced against utility and preferences for emotions shift according to how beneficial they are generally thought to be in different contexts (Tamir, Chiu & Gross, 2007). Said simply, happiness may not always be beneficial in every situation and there can be a wrong time for happiness (Gruber, Mauss & Tamir, 2011). Tamir and her colleagues document also that individual differences can predict differences in beliefs about the utility for particular emotions in certain contexts. For example, people high in neuroticism show a greater preference for fear and worry before a test as they believe that these emotions would be more helpful than those low in neuroticism (Tamir, 2005).

While, our argument is consistent with the instrumental approach, it is also different in several key respects. First, the instrumental approach focuses primarily on immediate emotional preferences in relation to a specific situation or context (e.g. choosing to get angry before a confrontation). In our approach, we examine the desirability of happiness situated in a more generalized context of being in a particular culture and living environment. Hence in our argument, utility is not judged in immediate relation to a particular event or episode but instead it is considered in relation to the more long-term and broad environmental conditions that a person's life is situated within. Second, the focus of the instrumental approach is primarily on the self, in that it makes predictions about the personal preferences of individuals with regards to their own emotions. Our argument extends this question of emotional preference beyond the self, to examine interpersonal judgments of happy others and generalized views about the appropriateness of happiness in a community. Third, the instrumental approach examines individual differences in emotional preferences, for example by personality types, while our approach is to apply this environment fit

framework to examine cultural differences in preferences between different countries. Hence we move the focus of analysis from the individual to the group.

Applying the context-specific utility framework, we specifically considered the resource building and approach behaviors triggered by happiness and propose that a harsh environment that would likely be inhospitable to happiness would be characterized by the following – 1) environmental conditions would be harsh and there would be generalized threats to one's community or group, 2) there would be significant potential costs to experimentation or exploration, and 3) avoiding failure would be perceived as more important than potential improvements that might be reaped from innovation. Uneven distributions of disease causing pathogens around the world provided us with a good way to test our hypotheses.

Infectious Diseases & Cultural Differences

Differing levels of historical prevalence of pathogens across different regions of the world have been proposed to account for a myriad of cultural differences observed today (Schaller & Murray, 2011). From a functional evolutionary perspective, human evolution was guided to produce functional responses to fitness-relevant opportunities and threats and since pathogens historically posed a serious threat to reproduction and survival, they too became powerful forces that guided evolution (McNeill, 1976). Humans purportedly evolved not just a physiological immune system, but also a kind of "behavioral immune system" in response to these threats (Schaller & Park, 2011). This second immune system triggers specific affective and cognitive reactions in response to threats of disease that facilitate behavioral avoidance of pathogens.

For example, in a situation of high threat of infectious diseases, you would be better off avoiding social contact with unfamiliar people to reduce the likelihood of catching an infection that could not only harm you, but also your family and community if you brought germs home with you. However, in a place where infectious diseases were not an issue, increasing social contact with as many people as possible could bring about many benefits, such as more opportunities for learning and greater social support. In other words, different distributions of pathogens cause the relative costs and benefits of certain behaviors to change (Schaller & Murray, 2011). In the example, we see that the benefits of being sociable become quickly outweighed by the potential costs of being exposed to pathogens in areas of high disease threats.

Another example is the greater use of culinary spices when preparing food that has been found among cultures that had higher historical levels of infectious disease threat (Billing & Sherman, 1998). Warm and wet tropical climates provide optimal conditions for many pathogens to thrive and as such, countries closer to the equator have histories of more rampant infectious diseases (Epstein, 1999; Guernier, Hochberg & Guégan, 2004). The parasite-stress model proposes that people living in these climates exhibit anti-pathogen tendencies more strongly as a defensive strategy to avoid getting infected (Low, 1990). In low pathogen regions, the cost of growing these spices (e.g. fertile land space and time spent cultivating the crops) would have been higher than the little nutritive value being offered by most spices; however Billing and Sherman's (1998) suggests that in regions with warmer climates, the anti-parasitic and anti-microbial benefits of the spices overcame their cost.

Researchers have proposed multiple processes that could drive how these behaviors or values come to be culturally transmitted or reinforced. These include direct cultural transmission of anti-pathogen norms and values, natural selection of

traits that enhanced survival and reproduction in pathogen-rich environments and an "evoked culture" mechanism where particular genes are expressed in response to one's developmental environment (Schaller & Murray, 2008; Schaller & Murray, 2011; Tooby & Cosmides, 1992). Regardless of how exactly these traits come to be transmitted between generations, the logic of this functional evolutionary argument is simple – if a behavior increases the likelihood of disease transmission, it will be less represented in areas with a history of high levels of infectious diseases. For example, people from high pathogen threat regions have been found to have lower levels of extraversion and less openness with sexual experimentation as these traits would have increased one's potential exposure to infected individuals and harmful pathogens (Schaller & Murray, 2008). Conversely, if a behavior helped to inhibit disease transmission, this could also lead to it being more prevalent in areas of high disease threats. For example, historical disease threats correlate with higher levels of xenophobia and wariness of people from outgroups (Thornhill, Fincher, Murray & Schaller, 2010) as staying away from unfamiliar people would have provided a buffer from disease transmission.

Using this functional evolutionary logic, several studies have documented evidence of how values or preferences shift in response to threats facing a group. For example, White, Kenrick and Neuberg (2013) showed that people valued physical attractiveness in their leaders when there were environmental cues that health was important and Cohen, Solomon, Maxfield, Pyszczynski and Greenberg (2004) showed that people valued charisma, masculinity and dominance in their leaders when there was intergroup conflict. Applying this to disease threats, historical pathogen prevalence has been found to influence levels of individualism and collectivism and of related values such as conformity and obedience (Fincher, Thornhill, Murray &

Schaller, 2008; Murray, Trudeau & Schaller, 2011). Where there had been high levels of infectious diseases in the past, there is now less individualism, more collectivism, and a stronger endorsement conformity and obedience. Values like creativity or experimentation with novel approaches might have helped with problem solving and innovation in safe environments, however if the imminent threat of death or serious illness was high, abiding by rituals or traditions, for example in food preparation or personal hygiene, might be far more important to survival as a means to ensure that well-established and safe practices were maintained.

Returning to our analysis of environments in which positive emotions would be valued less, in areas of high disease threats, all three of the conditions outlined earlier would occur. Hence we predicted that in regions with higher historical levels of disease threats, people would value positive emotions less and that in regions with lower historical levels of disease threats, positive emotions would conversely be more prized.

Overview of Correlational Studies

In the first set of correlational studies (Study 1 and Study 2), we examined historical data of pathogen prevalence in different regions of the world. In Study 1, we turned to international survey data that came from 3 separate samples which provided us with 4 different measures of the value that people from around the world place on happiness, including their preference for happiness and their judgments of happiness in others. In Study 2, we examined voting records at the United Nations (UN) General Assembly on a resolution to give more emphasis to happiness and well-being in guiding public policies. This provided us with a real world behavioral measure of the value that people from different cultures place on happiness. Following our pathogen

prevalence hypothesis, we expected to find that lower levels of historical pathogen prevalence would correlate with greater valuation of happiness. In other words, in regions where there had been low levels of infectious diseases, we expected that people would rate an ideal life as one that was marked by high levels of satisfaction and they would judge happy people more favorably. They would also report a higher preference for happiness and report experiencing more happiness. Finally, we also expected UN representatives from these low threat regions to vote in favor of more public policy emphasis on happiness.

Study 1– International Measures of the Value & Experience of Happiness

Method

Participants

In Study 1, we examined international survey data on happiness and well-being that came from 3 separate samples.

ICS.1995 Sample: Data from 7167 college students (39% male, 60% female and 1% unreported) from 41 countries were collected as part of the International College Student (ICS) project during 1995-1996. This project examined cultural differences in subjective well-being and findings from this data set have been published elsewhere (e.g. Diener et al., 2000).

ICS.2000 Sample: Again in 2000-2001, data from 10,477 college students (60.8% female, 39.1% male, 0.2% unreported) were collected from 48 countries as part of a separate ICS project.

World Values Survey: The World Values Survey is another international research project that examines people's values and beliefs. Six waves of the study

have been conducted since 1981. For our purposes, we examined life satisfaction ratings of 82 countries across all available waves of the research project for that country (World Values Survey Association, 2008).

Measures

Ideal Standards of Life Satisfaction. To examine the value of happiness, we extracted country level mean responses to a set of questions asked of the ICS.1995 sample. Participants rated how they thought an ideal person would complete the five-item Satisfaction with Life Scale (SWLS; Diener, Emmons, Larsen & Griffin, 1985). For example, participants rated to what extent an ideal person would agree with the statement "I am satisfied with my life." Responses for each of the five items ranged from 1 (strongly disagree) to 7 (strongly agree). In responding to these items, participants made an interpersonal judgment about whether happiness in others was deemed as desirable or ideal. Scores from these five items were then totaled to provide us with an overall index of ideal life satisfaction for each participant. Country level mean differences in these ratings provided us with comparisons of the value that each culture placed on leading a happy life.

Judgments of a Happy Person. A second indicator of how happiness was judged came from country level mean responses to a set of questions completed by participants in the ICS.2000 sample. Participants were asked to make judgments about another person who described him/herself as happy. The question read, "You happen to overhear a conversation in a café. In the conversation, Person A (same gender as you) tells the other person that she/he is extremely happy and very satisfied with her/his life. In your view, how likely do you think each of the 8 statements is true about Person A?" Five of the statements described person A with negative adjectives

(e.g. Person A is immature; Person A is disliked by others) and 3 statements described Person A positively (e.g. Person A is respected by others; Person A is moral). Participants rated their agreement with the statements on a scale of 1 (extremely unlikely) to 7 (extremely likely). We predicted that participants from regions with higher levels of historical pathogen prevalence would judge the very satisfied person more negatively.

Preference for Happiness. We were also able to identify 5 additional questions that assessed respondents' preferences for happiness in the ICS.2000 sample. First, respondents rated how much they valued happiness on a scale of 1 (do not value it at all) to 9 (value it extremely). Second, respondents separately rated how appropriate or valued a list of 13 emotions were in their society from 1 (not at all) to 9 (very much) and we extracted ratings for 3 of these emotions – contentment, happy and cheerful. And finally, respondents also rated how much of the time they would ideally like to feel positive emotions in general from 1 (none of the time) to 9 (all of the time).

Experienced Life Satisfaction. We also included measures of actual experiences of happiness in different countries. As stated earlier, emotional norms guide emotional experiences (Eid & Diener, 2001) and as such we expected that historical pathogen prevalence might also predict not just differences in emotional norms or values, but also actual emotional experiences as well. Respondents from both the ICS.1995 and ICS.2000 samples rated their own life satisfaction by completing the five-item Satisfaction with Life Scale (SWLS; Diener et al., 1985). We extracted country level mean scores for this scale and we will refer to these scores as SWLS.1995 and SWLS.2000 respectively. In addition, we also examined life satisfaction data extracted from the World Values Survey (WVS) (World Value

Survey Association, 2008) that we will refer to as SWLS.WVS. Participants of the WVS rated how satisfied they were with their life as a whole these days on a scale of 1 (dissatisfied) to 10 (satisfied).[2]

Pathogen Prevalence. Following the procedure used by Gangestad and Buss (1993), Murray and Schaller (2010) consulted old atlases of diseases and other historical and contemporary epidemiology sources to evaluate the historical prevalence of nine major infectious diseases – leprosy, malaria, dengue, typhus, tuberculosis, leishmanias, trypanosomes, schistosomes and filariae. For eight of the diseases, prevalence was coded on a 4-point scale (0 = completely absent or never reported, 1= rarely reported, 2 = sporadically or moderately reported, 3 = present at severe or epidemic levels at least once). Tuberculosis was coded on a 3-point scale of incidence for every 100,000 people in the region (1 = 3 - 49, 2 = 50 - 99, 3 = 100 or more). Each of the 9 disease prevalence scores was then converted to z scores and the overall disease prevalence score for a region was computed as the mean of the z scores included in the index. Murray and Schaller (2010) created pathogen scores reflecting the prevalence of these 9 pathogens for 160 geopolitical regions (Cronbach alpha = .84).

Results

Ideal Standards of Life Satisfaction. The ideal satisfaction scores of the 41 countries in the ICS.1995 sample ranged from 19.80 to 31.14, (M = 27.54, sd = 2.65). The pathogen prevalence scores for the 41 countries ranged from -1.00 to 1.16, (M =

[2] The WVS has an additional question on happiness that reads, "taking all things together, would you say you are" and participants respond on a scale of 1 (very happy) to 4 (not at all happy). Country-level averages on this question ranged only from 1.5 to 2.57 and 58% of the countries sampled had averages ranging from 1.5 to 2.0. This range restriction of responses did not lend itself to our correlational analysis approach.

.05, sd = .62). Comparing the ideal satisfaction data we had on 41 countries with their historical pathogen prevalence scores, we found a significant negative correlation (r (41) = -.50, p = .001). Figure 1 shows the relationship with each of the 41 countries plotted. As shown, cultures tended to rate high levels of satisfaction as an ideal at lower levels of historical prevalence of pathogens and this satisfaction level then decreased as pathogen prevalence increased. Thus, in support of our hypothesis, positive emotions were more valued or desirable in regions with lower historical levels of disease threats.

Judgments of a Happy Person. To establish an index of the overall judgment of the happy person, we first reverse coded the negative adjective ratings and then took the average of the 5 reverse coded negative ratings and the 3 positive ratings (α = .91). This gave us an overall negative judgment rating of the happy target. These judgment scores of the 48 countries ranged from 3.45 to 5.12, (M = 4.58, sd = .34). The pathogen prevalence scores for the 48 countries ranged from -1.31 to 1.17, (M = .03, sd = .69). As shown in Figure 2, we found a significant negative correlation (r(48) = -.29, p = .04) between historical pathogen scores and judgments of the happy person. In cultures with higher levels of historical prevalence of pathogens, people tended to judge the very satisfied person described in the scenario provided less positively. Conversely, at lower levels of pathogen prevalence, people judged the person more positively. Thus, in support for our hypothesis, happiness was judged more favorably in regions with lower historical levels of disease threats.

Preference for Happiness. We calculated an index of respondents' overall preference for happiness by taking the average of the 5 items described above (α = .86). The preference for happiness scores for the 48 countries ranged from 6.18 to 7.88, (M = 7.25, sd = .41). As shown in Figure 3, people in regions with lower

historical levels of disease threats showed a marginally greater preference for happiness and as historical pathogen levels increased, this preference tended to decline (r (48) = -.26, p = .067).

Experienced Life Satisfaction. The SWLS.1995 scores were available for 41 countries and ranged from 3.29 to 5.28, (M = 4.37, sd = .42). SWLS.2000 scores were available for 48 countries and ranged from 3.20 to 5.54 (M = 4.44, sd = .54). And finally, SWLS.WVS scores were available for 85 countries with a range from 3.87 to 8.31 (M = 6.38, sd = 1.09). As shown in Figures 4a to 4c, all three scores provided support for our hypothesis as we found that people in regions with lower historical levels of disease threats reported experiencing higher levels of satisfaction as well (SWLS.1995: r (41) = -.42, p =.006; SWLS.2000: r (48) = -.55, p = .000; SWLS.WVS[3]: r (82) = -.21, p = .053).

Study 1 Additional Analyses

Given that the argument proposed is that pathogen prevalence causes the cross-cultural differences in happiness, it is incumbent on us to consider a variety of alternative variables that might covary with pathogen prevalence. Only by showing that pathogen prevalence uniquely predicts the cross-cultural differences even after controlling for these variables can we enhance our certainty of this causal relationship. Specifically, we examined the effects of two indicators that have been shown to correlate with pathogen prevalence - GDP (an index of economic development) and individualism. Previous research has shown that higher GDP and individualism tends to correlate with higher satisfaction (Diener et al., 1995; Diener et al., 2003; Diener & Suh, 1999). To conduct this analysis, GDP per capita data was

[3] Pathogen prevalence scores were only available for 82 out of the 85 countries for which there were World Values Survey Satisfaction data.

extracted from www.worldbank.org for the year 1995 (for comparisons with ICS.1995 data) and 2000 (for comparisons with ICS.2000 data).[4] We extracted ratings for individualism from Fincher et al.'s (2008) analysis of how pathogen prevalence predicts individualism.

Following the approach used by Murray et al. (2011), we first examined the effect of each confound by conducting a series of two-predictor regression analyses so as to address concerns of multicollinearity. First, to examine the effect of GDP, we ran regression analyses on each of the six happiness measures where we included both GDP and pathogen prevalence as predictors (see Table 1). We found no unique effects of GDP on happiness in five out of six of the measures. However, pathogen prevalence continued to have a statistically significant unique effect on four of the six measures. Next, to examine the effect of individualism, we ran regression analyses on each of the six happiness measures and included both individualism and pathogen prevalence as predictors (see Table 2). We found a similar pattern of results. No unique effects were found of individualism on happiness in five out of the six measures. However, pathogen prevalence continued to have a statistically significant unique effect on three of the six measures. In summary, even when we controlled for each of the two possible confounding factors in turn, pathogen prevalence remained a significant predictor of at least half of our happiness measures. However, when we controlled for the effect of pathogen prevalence, the two factors were no longer significant predictors of happiness across five out of six of the measures. Since the effect of GDP and individualism largely becomes non-significant after controlling for pathogen prevalence, this suggests that the relationship between these two factors and

[4] For WVS survey, we used the average of the GDP data from 1995 and 2000 we had extracted to provide a proxy for a longer-term view of a country's GDP.

happiness could instead be caused by the fact that they could all be consequences of historical pathogen prevalence.

In addition to these analyses, we also conducted regression analyses in which we included pathogen prevalence, GDP and individualism simultaneously as predictors of each of the six measures of happiness (see Table 3). Pathogen prevalence remained a significant or marginally significant predictor in three out of the six measures (ideal standards of life satisfaction and experienced life satisfaction in two different samples). As noted by Murray et al. (2011), "statistical inference is especially limited for these analyses, given the statistical bias towards nonsignificance that accompanies high levels of multicollinearity" (p. 325). However, even given the strong statistical bias against obtaining significant results, we still find evidence in our data that supports the case that pathogen prevalence uniquely predicts the value of happiness.

Study 2 – United Nations (UN) Voting

Study 1 provided a strong collection of compelling real world evidence from survey responses of individuals from around the world about their experiences, beliefs and preferences. In Study 2, we extended this international comparison approach to examine a behavioral measure of the value placed on happiness. We examined the voting records of UN member states on a resolution that proposed that happiness should feature as a more central consideration in public policy decisions.

Method

UN Voting Records. In July of 2011, the UN General Assembly adopted resolution 65/309 – Happiness: towards a holistic approach to development. This

resolution, which was proposed by the King of Bhutan, stated that the pursuit of happiness is a fundamental human goal and encouraged the development of measures of happiness and well-being to better guide and balance public policies. The resolution also recognized that GDP as an indicator was not designed to (and does not adequately) reflect the happiness and well-being of people in a country and stressed the need for a more balanced approach to production and consumption that better promotes happiness and well-being.

The resolution was supported, or co-sponsored, by 66 of the 193 member states of the UN. While politics is complicated and there are surely many factors that contributed to the decision by each member state to co-sponsor this resolution or not, a vote in favor of the resolution does provide us with an indication that happiness is likely to be deemed as a priority for that country.

Pathogen Prevalence. As done in Study 1, we used Murray and Schaller's (2010) 9-item pathogen prevalence score for our analysis in this study. However, we found that of the 193 member states of the UN, this score was only available for 150 of them. Since historical data on tuberculosis and leprosy were lacking for many regions where data on the other diseases were available, Murray and Schaller (2010) also computed a subset 7-item score for 224 regions that excluded estimates for those two diseases. For this study, we also examined the results using this seven-item pathogen prevalence score as well (Cronbach alpha = .75). This score was available for all the 193-member states.

Results

The 9-item pathogen score was available for 55 of the member states that supported the resolution and 95 of the member states that did not. Comparing these

two groups of countries on their 9-item score, we find that sponsoring UN member states did in fact have a lower level of historical pathogen history (M = -.30, sd = .62) than non-sponsoring states (M = .41, sd = .54), t (148) = 7.36, p < .001, d = 1.21.

We repeated this analysis using the 7-item pathogen score which was available for 65 sponsoring and 124 non-sponsoring states. We found the same pattern of results. Comparing the countries on this 7-item score, we again find that co-sponsors of the resolution had a lower level of historical pathogen history (M = -.23, sd = .56) than non-sponsors (M = .27, sd = .59), t (187) = 5.64, p < .001, d = .82. In summary, as shown in Figure 5, across both indices of pathogen threats, we found support for our hypothesis that people from regions with lower historical levels of infectious diseases placed more emphasis on happiness as a priority, while those from regions of higher historical threats valued happiness less.

Study 2 Additional Analyses

As with Study 1, to bolster our causal argument, we ran a set of additional analyses controlling for GDP as a possible confound. As expected, both pathogen prevalence and GDP did significantly predict voting decisions separately. Wealthier countries (β = .31, p < .001) and countries with less historical pathogen levels (β= -.52, p < .001) were more likely to vote in favor of the resolution on happiness. Next, both GDP and pathogen prevalence were simultaneously entered as predictors of voting behavior. We found that pathogen prevalence remained a significant predictor of voting behavior (β= -.45, p < .001), however after controlling for the effect of pathogens, GDP was no longer a significant predictor (β = .11, p = .21). Again, this suggests that the effect of GDP on the value a country places on happiness (as

reflected in their voting behavior in this instance) could largely be accounted for by geographic differences in historical pathogen prevalence.

Overview of Experimental Studies

Study 1 and Study 2 provided compelling real-world attitudinal and behavioral evidence of the inverse relationship between disease threats and the desirability of happiness. One limitation was the correlational nature of the data. Thus, to examine our causal hypothesis more explicitly, we conducted a series of experimental studies where we randomly assigned participants to different conditions of pathogen threats. In Study 3, we experimentally manipulated disease threats using photographs and we measured participants' judgments of individuals who had reported that they were either very or only mildly happy. In Study 4, instead of photographs, we used short stories to experimentally prime disease threats and we measured participants' judgments of the same targets again. Finally, in Study 5, we added in a self-protection threat condition in order to examine the impact of another kind of threat on judgments of happiness. We also measured the desirability of happiness more directly in Study 5 by asking participants to rate how appropriate happiness was in their society and if high levels of life satisfaction was deemed ideal. Extending the pattern of findings from our correlational studies, we expected to find that when primed with disease threats, people would rate high levels of happiness as less favorable and report that happiness would be less desirable or appropriate. We expected that this effect would be observed only when exposed to disease threats and not self-protection threats.

Study 3 –Disease Threats and Interpersonal Judgments (Photo Prime)

Method

Participants. Ninety-three participants living in the United States (52 men, 41 women; mean age = 34.4 years) were recruited for this study via Amazon's Mechanical Turk platform.

Procedure. Participants were randomly assigned to either the disease threats or control condition. In both conditions, participants were asked to view a set of images and to imagine themselves in the same room as the item shown in the picture. They were told that they would be tested on their memory of the pictures presented. Participants in the disease threats condition were shown 8 images related to disease (e.g. person sneezing, moldy food, chicken pox marks). Participants in the control condition were presented with 8 images of office stationery (e.g. stapler, scissors, pens). After viewing the images, participants were asked to describe the last time they had encountered some of the items pictured. We adapted this priming condition from Mortensen, Becker, Ackerman, Neuberg and Kenrick (2010).

Next, participants viewed part of a survey that had ostensibly been completed by someone else – the target. The survey question read, "Here are some faces expressing various feelings. Which face comes closest to expressing your feelings on most days?" Half of the participants (randomly assigned to the very happy condition) saw that the target had circled the most extreme of seven options that showed a face with the largest smile. The other participants were in the mildly happy condition and their target had circled a face with a partial smile that was the fifth option of the seven faces presented (see Figure 6). Participants were asked to make judgments about the target based on the survey information that they had seen by rating their agreement to five statements about the person on a scale of 1 (strongly disagree) to 7 (strongly agree). The statements were: 1) This person would be a good leader, 2) I would want

this person to be my colleague, 3) This person would be respected by others, 4) This person would have many friends and 5) This person would be disliked by others. We calculated an overall positive assessment score of the target by taking the average score of the five items (with item 5 on dislike reverse coded) (α =.76).

Results

A 2 X 2 (prime condition X target's happiness) factorial analysis of variance tested the effects of the photo primes on judgments of the very and mildly happy targets. Results indicated a significant main effect of the target's happiness on the positive assessment of the target, F (1, 92) = 11.17, p = .001. The very happy target was judged more positively (M = 5.34, sd = .73) as compared to the mildly happy target (M = 4.81, sd = .74), t (91) = 3.43, p = .001, d = .72. There was a marginally significant main effect of prime condition as well, F (1, 92) = 3.27, p = .07. Overall, participants in the control condition (M = 5.20, sd = .87) assessed targets marginally more favorably than in the disease condition (M = 4.93, sd = .62), t (91) = 1.69, p = .10, d = .35. Most importantly, the main effect was qualified by a significant interaction between the two factors, F (1, 92) = 4.71, p = .03, indicating that effects of the primes were not the same for two targets. The difference in positive assessment of the very happy target (M_{very} = 5.61, sd = .75) and the mildly happy target (M_{mild} = 4.79, sd = .68) was significant only in the control condition, t (48) = 3.71, p = .001, d = 1.07. In the disease condition, there was no significant difference in judgments of the two targets (M_{very} = 5.02, sd = .56 and M_{mild} = 4.85, sd = .68), t (41) = .91, p = .37, d = .28 (see Figure 7).

Study 4 –Disease Threats and Interpersonal Judgments (Story Prime)

In Study 3, we found that interpersonal judgments of people with different levels of happiness were impacted by the salience of disease threats. A person who was very happy was judged more positively than a person who was only mildly happy under control conditions. However, in situations where the threat of disease was salient, both mildly and very happy others were judged similarly. These findings provided first experimental support that happiness is valued less when pathogen threats were more salient. In Study 4, we sought to replicate these findings using a different experimental manipulation. In Study 4, we manipulated disease threats using stories instead of photographs.

Method

Participants. Seventy participants living in the United States (30 men, 40 women; mean age = 34.0 years) were recruited for this study via Amazon's Mechanical Turk platform.

Procedure. In this study, participants read a story and imagined themselves in the situation described. They were told that their memory of this story would later be tested. Participants were randomly assigned to either the disease threats or control conditions. In the disease threats condition, participants read a story about a person volunteering at the geriatric ward of a hospital. The story described the person being exposed to disease-related situations, including getting sneezed on by a patient, having to change bandages on an open sore and being in a confined room with people who were coughing. Participants in the control condition read a story of similar length that described a person organizing his office space, including sorting paperwork into folders, organizing books on a self and clearing up loose stationery items on his desk. These priming manipulations have been used in previous studies that examined the

impact of disease threats on other psychological variables (e.g. White et al., 2013). After reading the story, participants were again randomly assigned to either the very happy or mildly conditions where they viewed the same survey stimuli used in Study 3. The only difference was that to avoid positional effects of our scale, we counterbalanced the order of the target's response options, such that the face with the largest smile was positioned as the left-most choice in this study (as opposed to it being positioned in the right-most position in Study 3). Again, participants completed the same judgment task used in Study 3 and we calculated an overall positive assessment score of the target by taking the average of the five items (with item 5 on dislike reverse coded) (α = .74).

Results

A 2 X 2 (prime condition X target's happiness) factorial analysis of variance tested the effects of the story primes on judgments of the very and mildly happy targets. There was a significant main effect of the target's happiness on the positive assessment of the target, F (1, 69) = 11.61, p = .001. The very happy target was again judged more positively (M = 5.19, sd = .76) as compared to the mildly happy target (M = 4.54, sd = .72), t (68) = 3.83, p = .000, d = .93. In this study, there was no significant main effect of prime condition on positive assessment, F (1, 69) = 1.66, p = .20. Overall, participants in the disease (M = 4.72, sd = .67) and control conditions (M = 5.01, sd = .83) made equally positive assessments of the target, t (68) = 1.60, p = .12, d = .39. More importantly, the main effect was again qualified by a significant interaction between the two factors, F (1, 69) = 14.41, p <.001. This once again indicated that effects of the primes were not the same for two targets. As with Study 3, the difference in positive assessment of the very happy target (M_{very} = 5.48, sd =

.54) and the mildly happy target (M_{mild} = 4.35, sd = .71) was significant only in the control condition, t (39) = 5.81, p < .001, d = 1.86. In the disease condition, there were no significant differences in judgments between the two targets (M_{very} = 4.68, sd = 0.84 and M_{mild} = 4.75, sd = .50), t (27) = .24, p = .81, d = .09 (see Figure 8).

Study 5 – Disease & Self-Protection Threats and Normative Judgments

In Studies 3 and 4, we used two different experimental manipulations and found that happiness was valued less when pathogen threats were more salient as compared to control conditions. Our dependent variable was an interpersonal judgment task which examined how a very versus mildly happy person was judged. In Study 5, we sought to replicate this pattern of results using a more explicit dependent measure. We asked participants directly if happiness was appropriate and what an ideal level of satisfaction would be.

We also used Study 5 to address an alternative explanation for our findings. Did the disease threats prime lead to lowered valuing of happiness because of the disease threats or because it induced negative emotions in our participants? To test whether disease threats have a unique impact on preferences for happiness, we included an additional experimental condition of a self-protection threat in Study 5.

We chose this self-protection threat for two additional reasons. The first was that it was an established prime that had been previously used in other studies that examined the unique effects of disease threats primes (see White et al., 2013). The second was that this experimental condition allowed us to do a basic test of part of the first environmental conditions we proposed – environmental conditions would be harsh and there would be generalized threats to one's community or group. While the threat of pathogens represents a broader and more pervasive threat to everyone in a

community, the threat of an intruder in one's house is a more individualized and specific threat. Our prediction was that the valuation or desirability of happiness in one's society would be more related to generalized threats to one's community or group than to specific threats to an individual. Hence, we expected that ratings of the appropriateness of happiness and ideal satisfaction would be lower in the disease threats condition than the control condition, but that there would be no differences on these variables between the self-protection and control conditions.

Method

Participants. One hundred and twenty-three participants living in the United States (58 men, 65 women; mean age = 32.2 years) were recruited for this study via Amazon's Mechanical Turk platform.

Procedure. In Study 5, we used the same disease threats manipulation as Study 4, but we added a third condition on self-protection. Participants in this condition read a story about a person who was home alone on a stormy night who realizes that an intruder is breaking into the house. The story described the person sitting in the dark in the bedroom hearing a series of sounds including the front door squeaking open and someone's footsteps getting closer. Again, this priming manipulation was also adapted from previous studies that had examined the impact of disease threats on other psychological variables (e.g. White et al., 2013). After reading the stories, participants were asked to rate how appropriate the emotions happiness and joy were in their society from 1 (extremely inappropriate) to 7 (extremely appropriate). Participants were also asked how an ideal person leading an ideal life would respond to the 5-item Satisfaction with Life Scale (Diener et al., 1985).

Results

A one-way between subjects analysis of variance (ANOVA) was conducted to examine the effect of our story primes on our dependent variables. There was a main effect of the story primes on the appropriateness rating of happiness, $F(2, 120) = 7.39$, $p = .001$, $\eta^2 = .11$, and joy, $F(2, 120) = 4.04$, $p = .020$, $\eta^2 = .063$. And there was also a main effect on ideal satisfaction ratings, $F(2, 120) = 3.41$, $p = .036$, $\eta^2 = .054$. As we had expected, post hoc comparisons using the Tukey HSD test revealed that participants in the disease threats condition, endorsed lower levels of happiness ($M_{happy} = 5.95$, sd = .61), joy ($M_{joy} = 5.79$, sd = .70) and ideal satisfaction ($M_{ideal.swls} = 4.52$, sd = 1.67) than participants in the control condition ($M_{happy} = 6.43$, sd = .55; $M_{joy} = 6.24$, sd = ..69; $M_{ideal.swls} = 5.39$, sd = 1.48). And addressing the alternative argument about the effect of any negative mood induction, there were no significant differences between participants in the control and self-protection threat conditions on ratings of happiness ($M_{happy} = 6.17$, sd = .54), joy ($M_{joy} = 5.93$, sd = .78) and ideal satisfaction ($M_{ideal.swls} = 4.70$, sd = 1.61) (see Figure 9).

Discussion

Across multiple studies and measures, we found that differences in the desirability and experience of happiness could be predicted by the relative prevalence of disease threats in the environment. In Study 1, we examined three samples of global data of four measures of happiness (ideal satisfaction, judgment of happy other, preference for happiness and experience of happiness). We found that lower incidences of historical disease threats predicted higher levels of the valuation and

experience of happiness around the world today. Further, we examined Gross Domestic Product and individualism as confounds in the relationship and found that pathogen prevalence effects may actually explain a large part of the observed relationship between the valuation and experience of happiness and these two confounds. Using a real-world behavioral measure in Study 2, we showed that countries that voted in favor of a happiness resolution had historically lower pathogen levels than those that did not. Further, while voting behavior was correlated with Gross Domestic Product, this relationship was no longer significant when the effect of pathogen prevalence was accounted for.

Next, we ran a series of experimental studies to further examine the proposed causal relationship between pathogen threats and the desirability of happiness. Two experiments showed that while very happy people usually enjoyed more favorable interpersonal judgments than only mildly happy people, under conditions of disease threats, this happiness advantage disappeared. When primed with concerns about disease using photographs (Study 3) or stories (Study 4), people no longer judged happier people more favorably than less happy people. Finally, in Study 5, we examined another kind of threat and showed that the pattern of results we observed was not simply driven by negative mood inductions. Using a set of three new dependent measures that examined people's expressed preferences for happiness, we found that disease concerns once again led to a decreased preference for happiness. However, when we compared people who had been primed with a self-protection threat to those in the control condition, we found no significant differences in their preferences.

This package of correlational and experimental studies presents a unique explanation for why there are cultural differences in the desirability and experience of

happiness that to our knowledge has never been examined. Our research project showed that historical pathogen prevalence differences provide a distal and more fundamental account for why there are observed differences in happiness today. This approach of applying a functional-evolutionary argument to explain cultural differences in happiness from a pathogen perspective could potentially be applied to understand differences in many other emotions. Further, in line with other research in this area, our results also show that this novel application of the growing research on the effects of disease threats may help to better explain the relationship between other established proximal variables that have been shown to be related to differences in emotional experiences (e.g. for happiness, Gross Domestic Product and individualism).

More importantly, our findings contribute to the literature on the function of positive emotions by providing insights into the boundary conditions under which happiness is deemed favorable. While much of existing research focuses on the desirability of happiness and the interpersonal benefits accrued to happy people, our findings emphasize that happiness is not always judged as ideal. Our research shifts the focus from the individual to his environment and underscores the importance of considering context when trying to understand the desirability of happiness. Further our results provide an explanation for why there are differences in happiness around the world that has, as yet, never been examined. We showed how differences in overall environmental harshness account for the cultural differences in the experience and valuation of happiness. As a whole, our findings demonstrate and explain why happiness, although seemingly universally appealing and beneficial, may actually only be favored in environments where its benefits can be realized and enjoyed.

Future Directions

This research began with a fundamental question that we wanted to address – why is happiness only valued in some environments and not others? Our hypothesis was that happiness would be judged more favorably in conditions where there were more benefits to the behaviors that happiness promotes. The results from our five studies give us a solid package of first support for this argument; however, many questions remain to be addressed by further studies.

First, uneven distributions of disease causing pathogens around the world provided us with one manifestation of the harsh environments we argue for, however to really test our theory further, the next step would be to examine other types or manifestations of these harsh environmental conditions. For example, other international measures of overall toughness of a community might include working hours per day or measures that indexed the degree of scarcity or abundance of resources in that environment. Another interesting approach would be to examine different corporate environments. Broadly, we would measure people's perceptions about the toughness of the organizational environments they work in and then examine the desirability or emphasis on positive emotions within their corporate culture. This research would build on the extensive work that examines the concept of person-environment (P-E) fit in organizations which refers to the compatibility between an individual and his work environment, with a greater match pointing to a stronger fit (Edwards, Cable, Williamson, Lambert & Shipp, 2006; Schneider, 2001).

Second, another important and related question that we have not yet had a chance to properly address is the three specific environmental conditions that we propose. Our current package of studies focused largely on environments where all three conditions were either present or absent. Hence, our research was unable to

properly address whether any of the conditions on its own is necessary or sufficient in determining if happiness comes to be valued in an environment. In Study 5, we did include a self-protection experimental condition that helped us to test part of the first of our three environmental conditions. We found evidence that the desirability or valuation of happiness in one's society was impacted more by generalized threats to one's community or group than to specific threats to an individual. To further develop and refine our theory, we will need to run additional tests like these to examine the components of our environmental toughness proposal.

Third, to fully develop our model, it will be important to study the mechanisms that mediate the relationship between environmental conditions and happiness. For example, one possible mediator of the relationship between disease threats and happiness could be the priming of avoidance goals.

Conclusion

People in some parts of the world find positive emotions more desirable than others. What accounts for this variability? Our studies are the first to our knowledge to apply a functional-evolutionary argument to account for cultural differences in happiness from a pathogen prevalence perspective. This set of studies revealed that the (un) desirability of happiness depends on the environmental context that a person finds himself in – where happiness provides more benefits then it is desired and where its benefits are fewer it can become undesirable.

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Table 1

Model 1 – Regression Analysis Predicting 6 Measures of Happiness with GDP and Pathogen Prevalence as Predictors.

	Ideal Life Satisfaction		Judgment of Happy		Preference for Happiness		SWLS. 1995		SWLS.2000		SWLS. WVS	
	β	*p*	*β*	*p*	*β*	*p*	*β*	*p*	*β*	*p*	*β*	*p*
GDP	.12	.49	-.09	.60	.08	.63	.16	.37	.16	.27	.62	***.001***
Pathogen Prevalence	-.45	***.01***	-.34	***.05***	-.22	.19	-.34	***.06***	-.46	***.003***	.10	.37

Table 2

Model 2 – Regression Analysis Predicting 6 Measures of Happiness with Individualism and Pathogen Prevalence as Predictors.

	Ideal Life Satisfaction		Judgment of Happy		Preference for Happiness		SWLS. 1995		SWLS.2000		SWLS. WVS	
	β	*p*	*β*	*p*	*β*	*p*	*β*	*p*	*β*	*p*	*β*	*p*
Individualism	.18	.39	-.03	.89	.01	.95	-.08	.72	.08	.68	.31	***.09***
Pathogen Prevalence	-.42	***.05***	-.29	.18	-.24	.27	-.49	***.03***	-.41	***.05***	.07	.72

Table 3

Model 3 – Regression Analysis Predicting 6 Measures of Happiness with GDP, Individualism and Pathogen Prevalence as Predictors.

	Ideal Life Satisfaction		Judgment of Happy		Preference for Happiness		SWLS.1995		SWLS.2000		SWLS. WVS	
	β	*p*	*β*	*p*	*β*	*p*	*β*	*p*	*β*	*p*	*β*	*p*
Pathogen Prevalence	-.41	***.07***	-.32	.15	-.22	.31	-.50	***.04***	-.39	***.06***	.11	.52
GDP	.001	.99	-.20	.31	.11	.59	.02	.94	.08	.66	.52	***.002***
Individualism	.21	.33	.07	.78	-.04	.88	-.12	.62	.20	.85	.01	.94

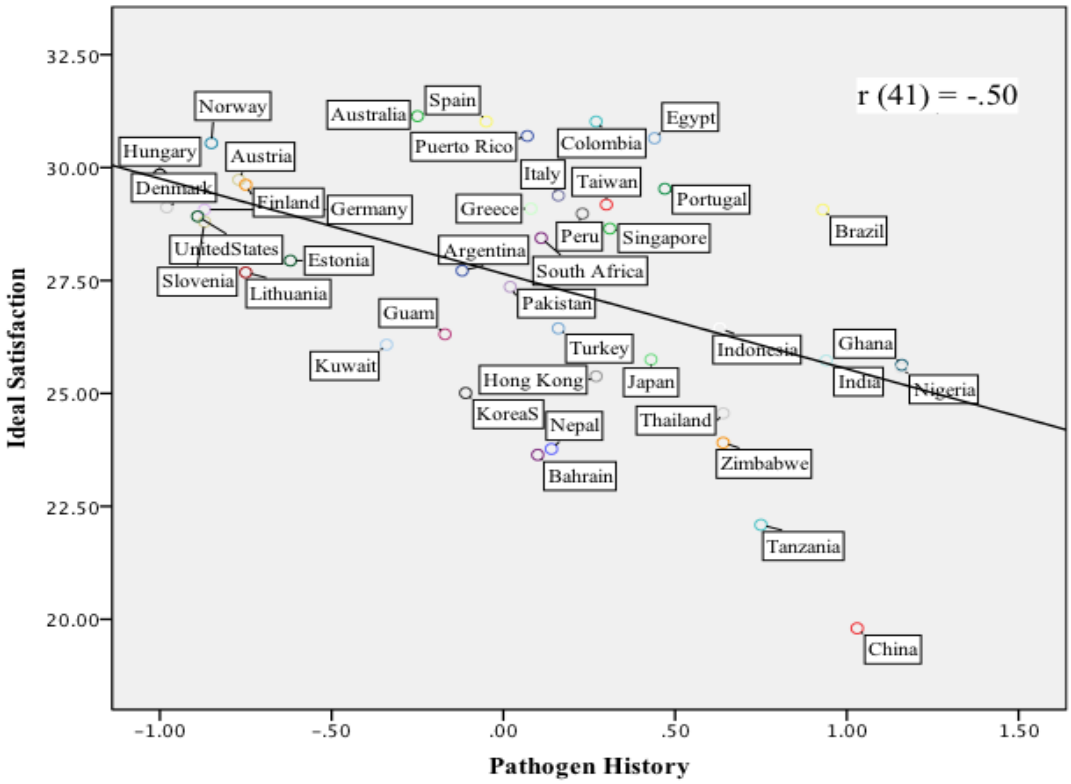


Figure 1. Correlation between historical pathogen prevalence and ratings of ideal levels of satisfaction (Study 1)

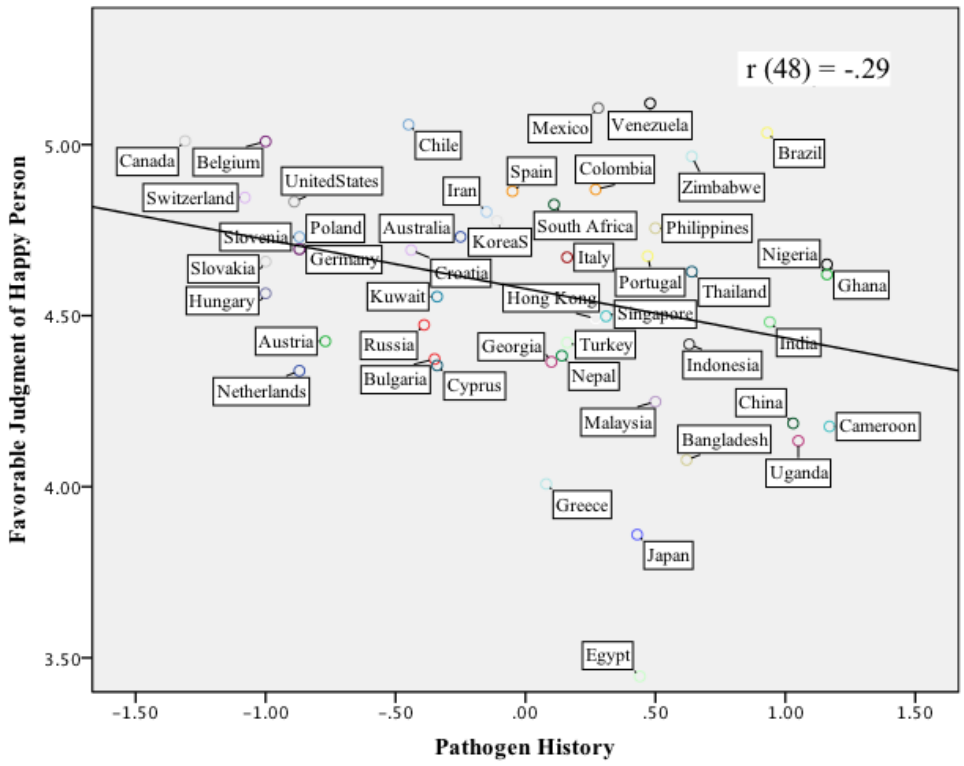


Figure 2. Correlation between historical pathogen prevalence and favorable judgment of Happy Person (Study 1)

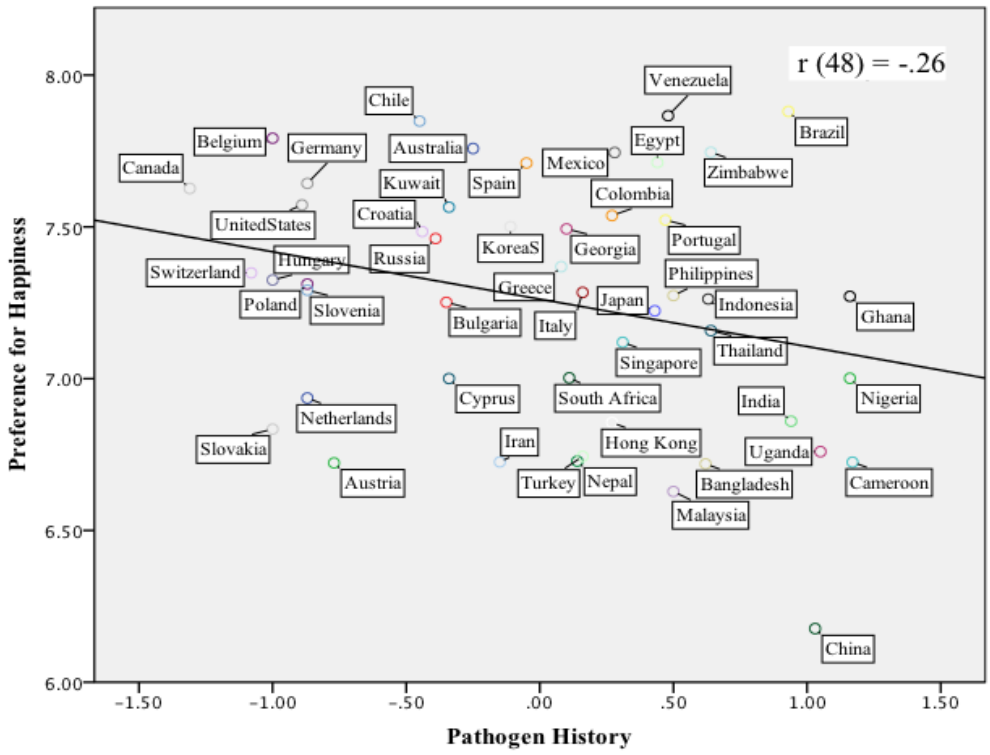


Figure 3. Correlation between historical pathogen prevalence and Preference for Happiness Ratings (Study 1)

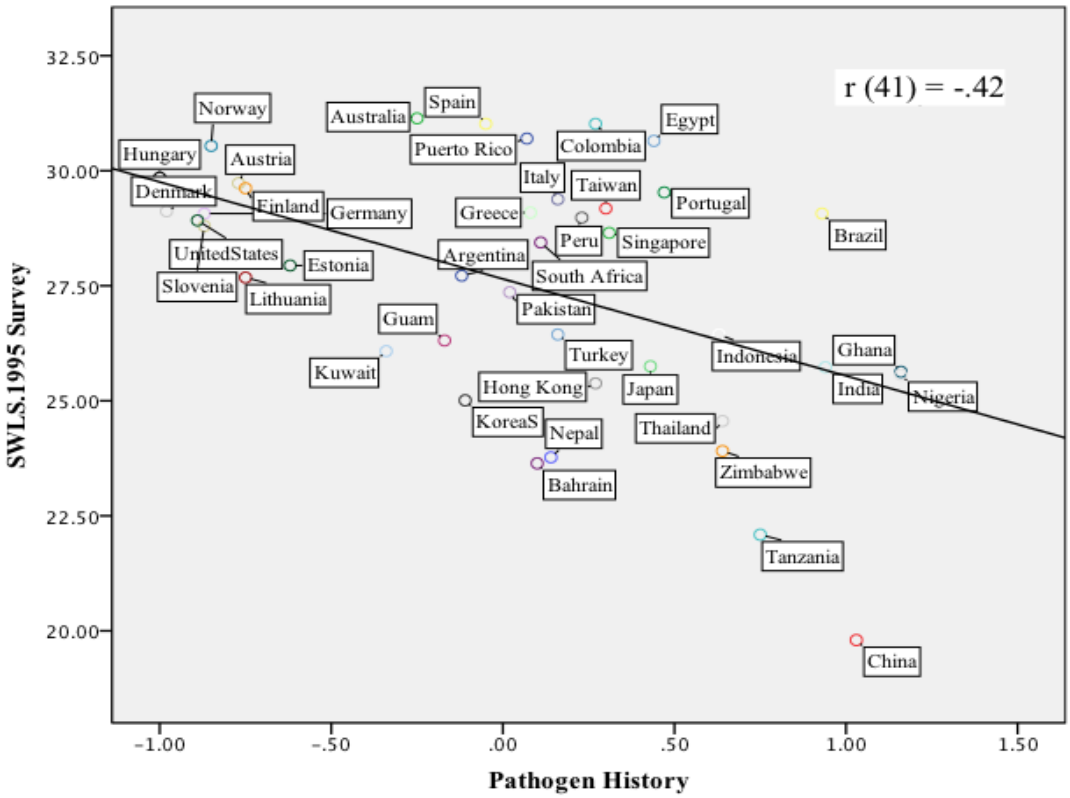


Figure 4a. Correlation between historical pathogen prevalence and Satisfaction with Life for ICS.1995 sample (Study 1)

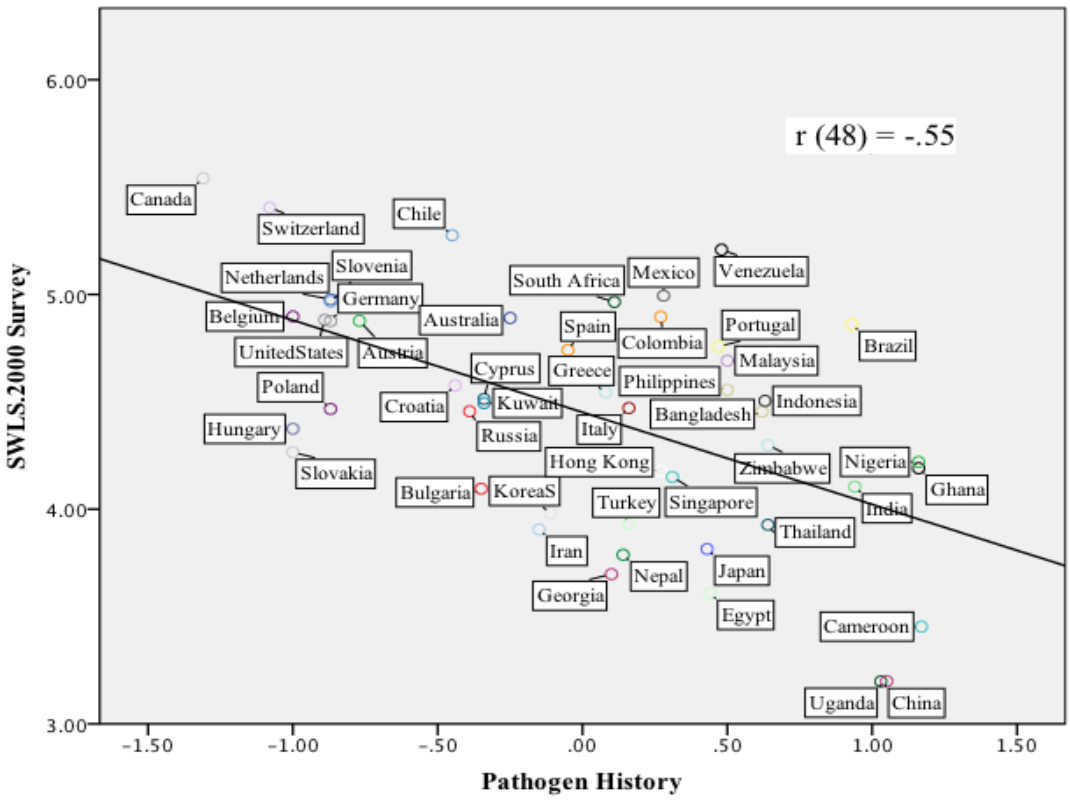


Figure 4b. Correlation between historical pathogen prevalence and Satisfaction with Life for ICS.2000 sample (Study 1)

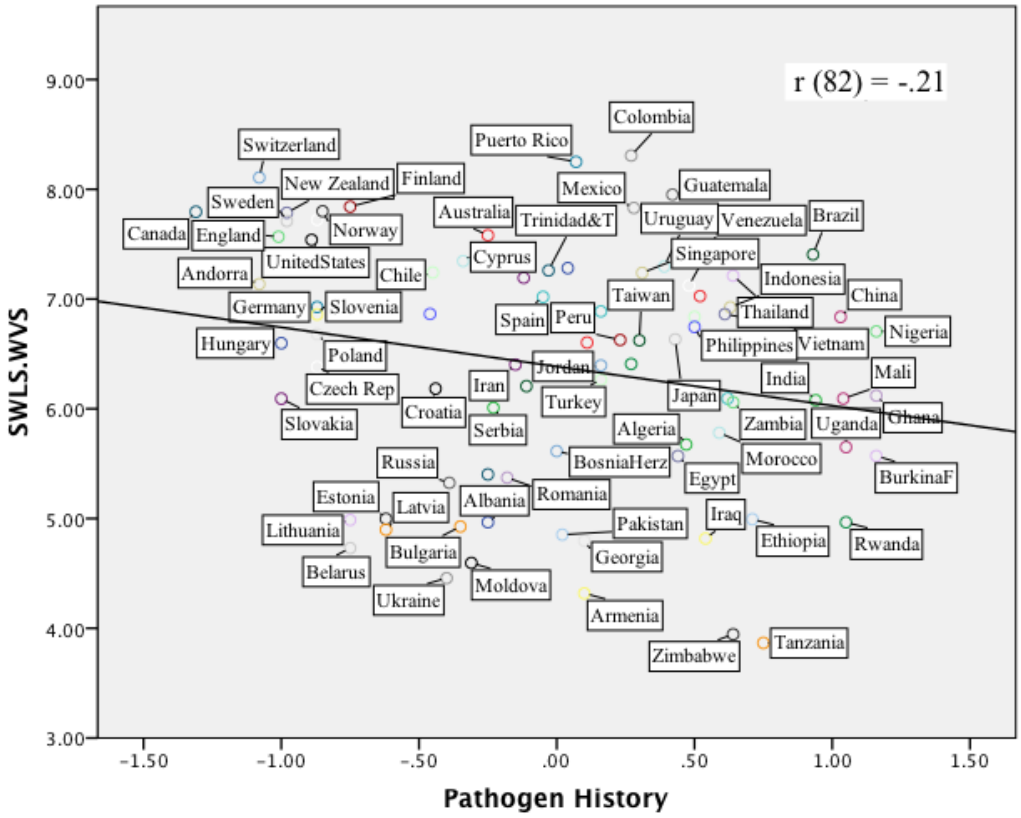


Figure 4c. Correlation between historical pathogen prevalence and Satisfaction with Life for World Values Survey (Study 1)

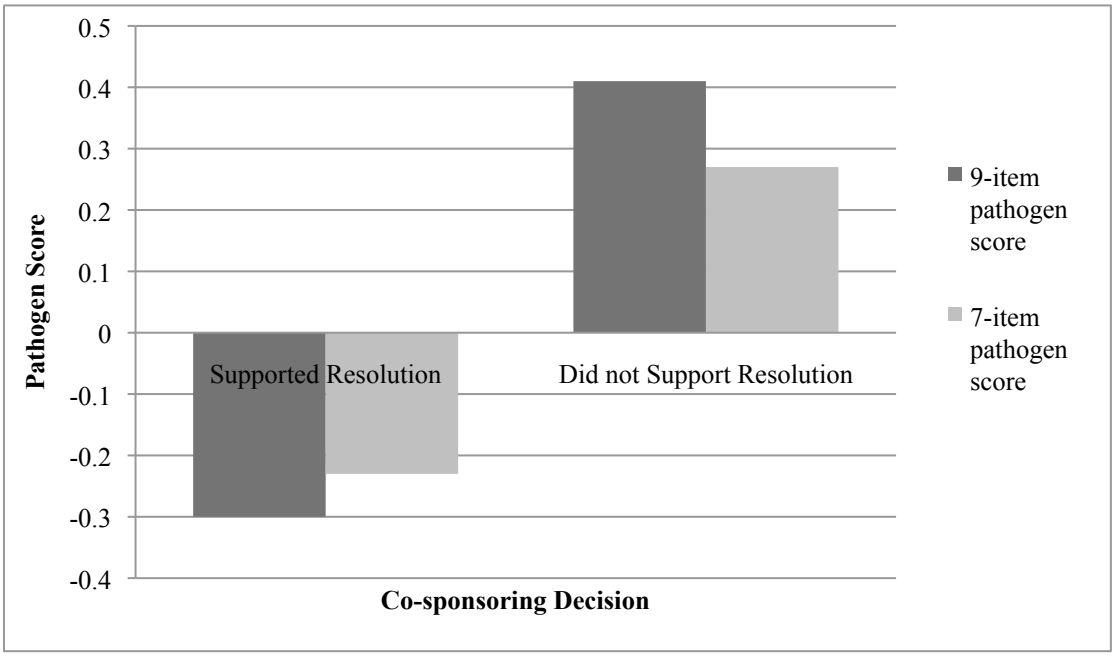
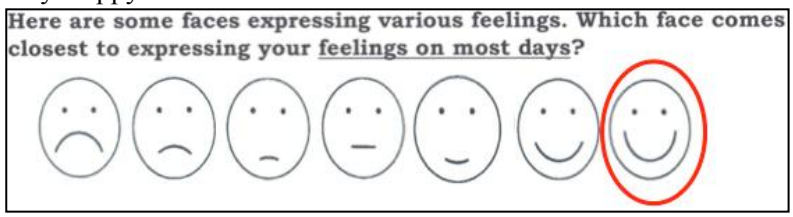


Figure 5. Mean Pathogen Scores of United Nations Member States that Supported and Did Not Support the Resolution on Happiness (Study 2)

Very Happy Condition Stimuli



Mildly Happy Condition Stimuli

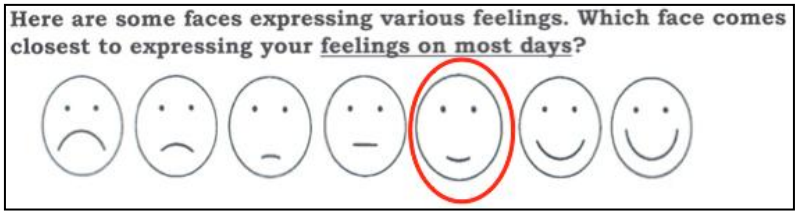


Figure 6. Stimuli For Very Happy and Mildly Happy Conditions

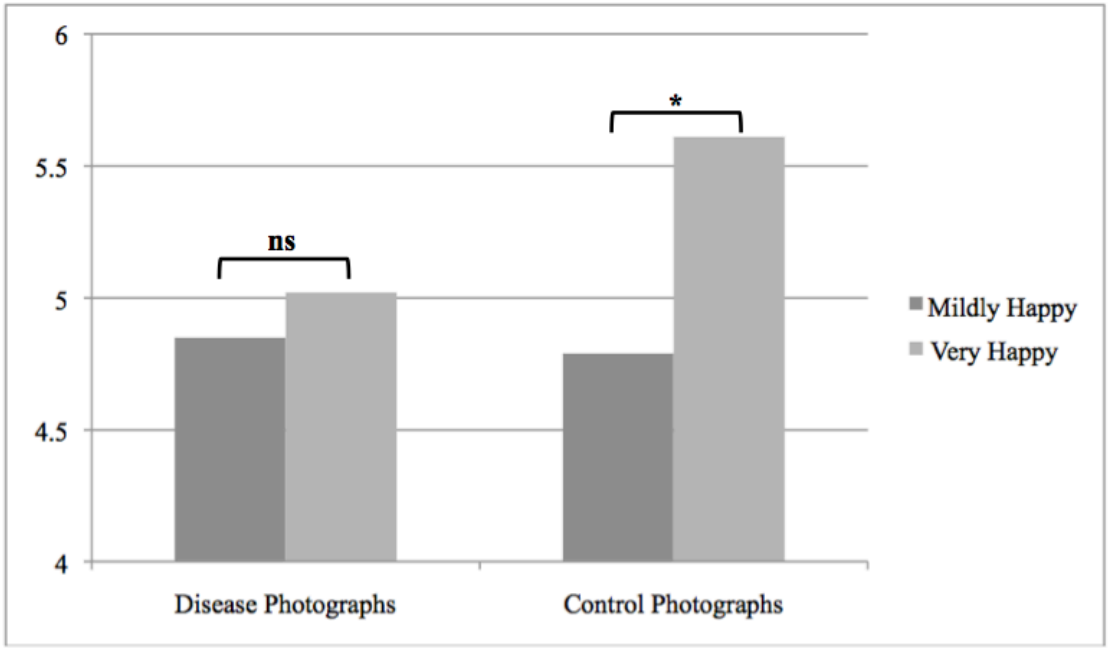


Figure 7. Positive Assessment of Targets by Photograph Priming Conditions (Study 3)

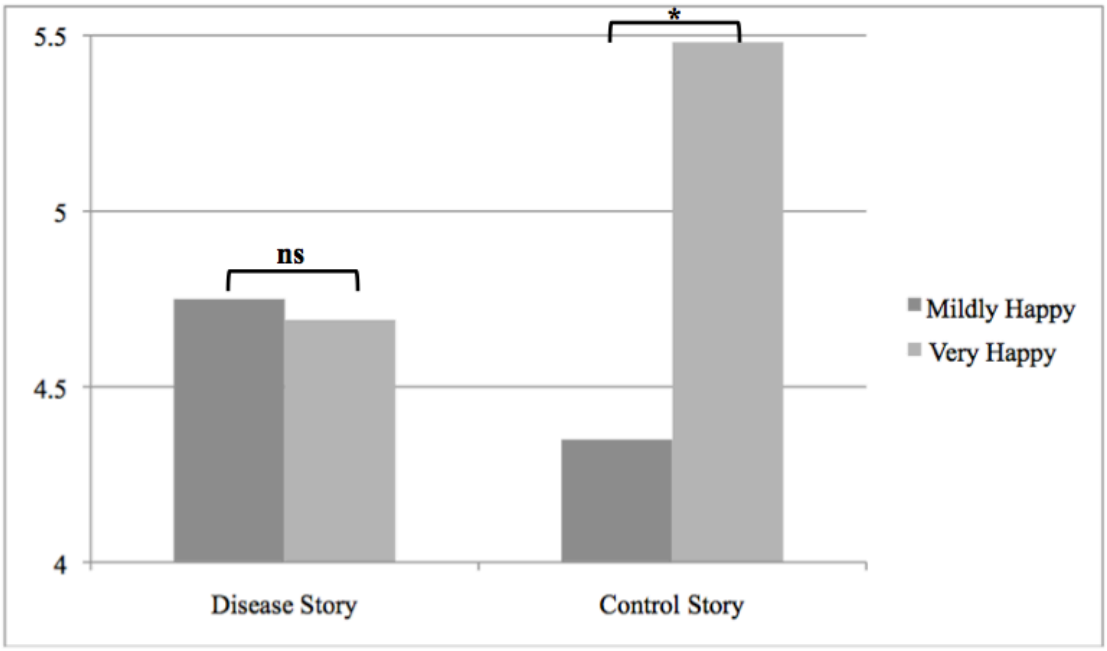


Figure 8. Positive Assessment of Targets by Story Prime Conditions (Study 4)

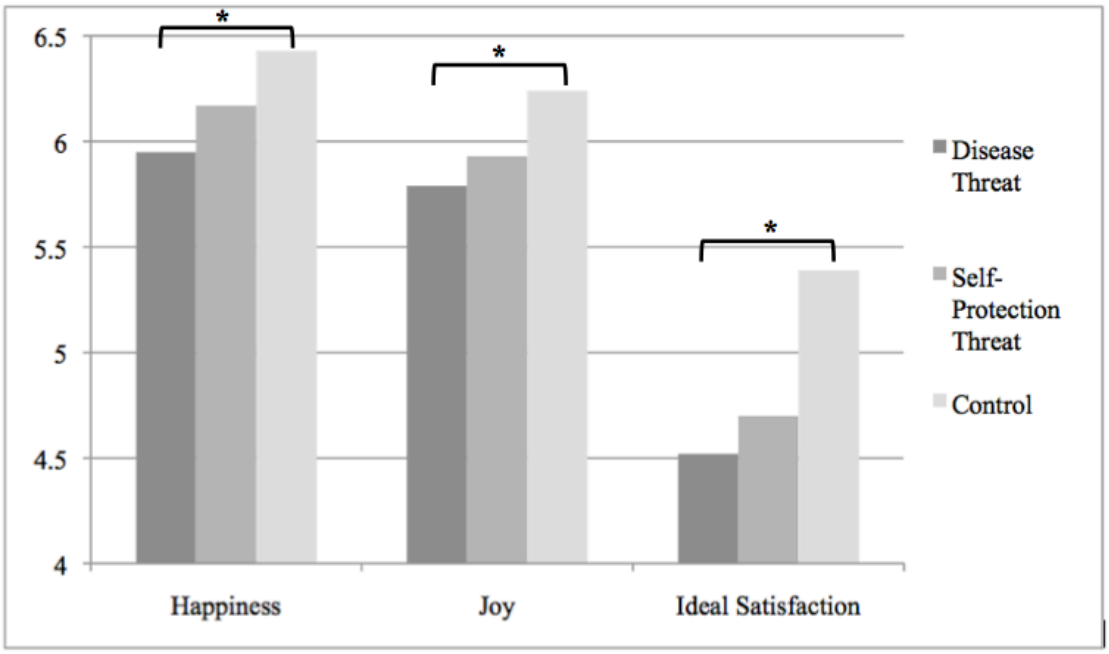


Figure 9. Happiness Normative Judgments by Story Prime Conditions (Study 5)