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Abstract: We incorporate anthropological insights into a stigma framework to elucidate the role of culture in threat perception and stigma among Chinese groups. Prior work suggests that genetic contamination that jeopardizes the extension of one's family lineage may comprise a culture-specific threat among Chinese groups. In Study 1, a national survey conducted from 2002-2003 assessed cultural differences in mental illness stigma and perceptions of threat in 56 Chinese-Americans and 589 European-Americans. Study 2 sought to empirically test this culture-specific threat of genetic contamination to lineage via a memory paradigm. Conducted from June to August 2010, 48 Chinese-American and 37 European-American university students in New York City read vignettes containing content referring to lineage or non-lineage concerns. Half the participants in each ethnic group were assigned to a condition in which the illness was likely to be inherited (genetic condition) and the rest read that the illness was unlikely to be inherited (non-genetic condition). Findings from Study 1 and 2 were convergent. In Study 1, Culture-specific threat to lineage predicted cultural variation in stigma independently and after accounting for other forms of threat. In Study 2, Chinese-Americans in the genetic condition were more likely to accurately recall and recognize lineage content than the Chinese-Americans in the non-genetic condition, but that memorial pattern was not found for non-lineage content. The identification of this culture-specific threat among Chinese groups has direct implications for culturally-tailored anti-stigma interventions. Further, this framework might be implemented across other conditions and cultural groups to reduce stigma across cultures.

Complete Title: Culture, Threat, and Mental Illness Stigma: Identifying Culture-Specific Threat among Chinese-American Groups

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Dear Dr. Panter-Brick,

Thank you for your invitation to revise and resubmit our manuscript entitled "Culture, Threat, and Mental Illness Stigma: Identifying Culture-Specific Threat among Chinese-American Groups" (SSM-D-12-02167) to Social Science & Medicine. Your reviewers found significant merit in the manuscript. Reviewer #4 stated that the study is "very interesting" while Reviewer #3 described the study as "important". Reviewer #2 stated that "This manuscript offers significant theoretical and empirical insights" and that "Overall the manuscript is well-written, and presents research findings that are original." Reviewer #1 "..liked this paper and recommended publication" and being "…pretty impressed by the data." While noting these strong and positive aspects of the manuscript, the Reviewers and the Editor found aspects of the manuscript that might be clarified and improved. We thank the Reviewers and the Editor for their very useful suggestions and believe that they have helped us to substantially improve the manuscript. The changes we have made to address each of the editor's and reviewer's comments are detailed below. The page numbers below refer to the manuscript text, starting from the Abstract (which would count as page #1).

Editors' Comments:

1) The revised manuscript should not exceed 8,400 words - including the abstract, text, references, footnotes, and tables.

**The revised manuscript is now a total of 8,391 words.

2) Endnotes and footnotes must be avoided.

**All endnotes and footnotes have now been deleted.

3) Your Research Highlights must conform to the specifications given in our Guide for Authors - 3 to 5 bullet points, maximum 85 characters each (including spaces).

**The Research Highlights now conform to these specifications.

4) Please ensure that the fieldwork dates for the studies are included in the Abstract and the Methods section of your paper.

The fieldwork dates are now included in the Abstract (p.1). The sentences read:

"In Study 1, a national survey conducted from 2002-2003 assessed cultural differences in mental illness stigma and perceptions of threat in 56 Chinese-Americans and 589 European-Americans."

"Conducted from June to August 2010, 48 Chinese-American and 37 European-American university students in New York City read vignettes containing content referring to lineage or non-lineage concerns."

The fieldwork dates are now also included in the Methods of Study 1 (p. 7- 8) and Study 2 (p.20). The sentences read:

Study 1: "The study sample consists of a subsample of Chinese-Americans (n=56) and European-Americans (n=589) who participated in a vignette experiment of public attitudes and stigma conducted from 2002-2003 (see AUTHOR, 2005).

Study 2: "The target population was students recruited from universities in New York City from June to August 2010 who self-identified as Chinese (immigrants or Chinese-Americans with one parent born in China) or European-American (≥1 parent born in U.S.). "

5) …The Methods section contains a statement that ethical approval was obtained, specifying the institution(s) which granted the approval (this statement should be blinded for peer review at this stage).

**Statements concerning ethical approval are now included in the Methods of Study 1 (p. 8) and Study 2 (p. 20). The sentences read:

Study 1: "Study protocols were approved by the institutional review board of [ANONYMIZED] Medical Center. "

Study 2: "Study protocols were approved by the institutional review board of [ANONYMIZED] University."

6) Please also ensure that identifiable references to previous publications by yourself (and any co-authors) have been anonymized in the text as (AUTHORS, date of publication) and the reference section of the paper (as AUTHORS (date of publication)), followed by - if applicable - the name of the peer-reviewed journal in which the article was published.

**We have implemented this procedure all throughout the text and reference section.

REVIEWER COMMENTS

Reviewer #1:

7) …My only comments concern the correlations among the dependent variables in E1. It seems that the various variables are probably pretty highly correlated and thus the independent tests on the dependent variables are not independent. We need some more information about these inter-correlations.

**Reviewer #1 raised an important point. Connected to comment #19, we have now moved the text to a separate section describing these correlations. We have also added a sentence to directly address this reviewer's point, reading "Items were in fact more highly correlated within threat domains, with lower correlation between threat domains." (p. 14).

The entire section on p. 14 reads:

"Intercorrelations between Threat Constructs. Our threat model (Figure 1) describes the three threat constructs as relatively independent. Items were in fact more highly correlated within threat domains, with lower correlation between threat domains. As expected, Violent was correlated most highly with Fear, $r(645)=.37$, p<.001, with all other correlations between threat constructs and Violent ≤.15. Similarly, Blame was correlated most highly with Anger, r(645)=.16, p<.001, with all other correlations between threat constructs and Blame ≤.08 or less. Finally, History MI was correlated most highly with Screening, $r(645)=.39$, p<.001, with all other correlations between threat constructs and History MI ≤.12."

Reviewer #2:

8) …Generally, the research methods and statistical analyses are appropriate; however, the manuscript raised several significant technical questions. Moreover, there are many ways in which the clarity of the manuscript can be improved (e.g., keeping language/terms consistent), which is particularly important given the complexity and density of the findings (including two vastly different studies).

**Due to the complexity and density of the findings, Reviewers 2 (comment #8) and 4 (comment #24) suggested that attention to clarity and consistency of language be used throughout the manuscript. In our revisions, we paid particular attention to clarity of the language and consistency of terms throughout the manuscript and tables. We believe that the current version is more clear and thank Reviewer 2 for the suggestion. For specific examples of where we have clarified and streamlined the language, please see responses to Comments #10, #13, #17, and #24.

Major Problems

9a) Participant Characteristics: The participants from Study 1 and Study 2 are not well described. In particular, key characteristics, including potential moderators, mediators, and confounders, are missing - especially in Study 2. Given the importance of family lineage, I expected to see socio-demographic data related to family/relationship status of the participants, such as relationship status (e.g., married/unmarried), parental status (e.g., children/no children), and whether or not a close relative lives with mental illness.

**Reviewer 2 suggested that we include additional participant demographic information related to family/relationship status of the participants, for instance, relationship status, parental status, and whether or not a close relative lives with a mental illness. There are two reasons we did not ask about relation and parental status. First, the sample was restricted to college students, thus,

the likelihood that they are married or have children is extremely low. Asking college students this information may strain our credulity as researchers, which may discourage other students from participating in this study if students talked to each other on campus. Based on this concern, we did not ask this information. Also, because participants were randomly assigned to condition for Study 2, if students did possess these characteristics (i.e., whether a close relative has mental illness) they should be evenly distributed across condition, which would not affect the results of this experiment.

Also, Comment #9b below describes how we now describe the demographic characteristics of the samples for Study 2.

9b) There may be key between-group differences that could confound the results, which may need to be controlled for…In Study 2, the authors do not report whether they examined or controlled for socio-demographic differences between the two groups.

** We now report all demographic variables that were collected (they were not included in the previous manuscript due to space limitations). This is included in the following sections:

(p.21): **"Demographic characteristics**

"Table 3 provides the Chinese-American and European-American samples' characteristics, including gender, age, education, place of birth, household income, political view and religion."

(p.41): Table 3, which shows the Chinese and European-American sociodemographic characteristics for Study 2

For all dependent measures for Study 2, controlling for socio-demographic differences between Chinese groups and European-Americans did not significantly affect study results. This is addressed in the following text:

(p. 21): "When comparing the Chinese-American and European-American groups, the Chinese-American sample was lower in income [$t(75)=2.83$, $p=.006$], more highly educated [$t(75)=2.86$, $p=.005$], and more conservative [$t(75)=5.26$, $p<=.000$] than the European-American sample. Likewise, Chinese-Americans and European-Americans differed by endorsed religion ($\chi2(7)=19.16$, $p=.008$; Table 2). Controlling for each demographic variable above in recall and recognition analyses did not significantly change reported results. Moreover, none of the variables emerged as a significant covariate in recall and recognition analyses and thus are not discussed further."

(p.26): "That our experiment utilized random assignment and we found no effects of sample characteristics on dependent variables increases our confidence that effects are not explained by sample differences."

9c) …It would also have been desirable to know the degree to which the respondents attribute mental illness to genetic causes, given the centrality of such a belief to the hypotheses.

**We agree with this reviewer's important point and have thus added a sentence to Study 2's limitations sections acknowledging this limitation:

p. 26-27: "Another potential limitation is that it would have been desirable to directly assess threat (instead of using memory as a proxy) and the degree to which respondents attributed mental illness to genetic causes as a result of the vignette condition.

10) Consistency of Language: Navigating the results section for Study 1 was challenging with having to alternate between the text and complex tables/figures. However, the authors do a nice job explaining their analysis. Clarity could be improved by using consistent labels for the tables, figures, and text. For instance, in Table 2 the authors refer to "Attribution," "Social-Cognitive," and "Moral Threat" (first column), which are referred to as "Symbolic Threat," "Tangible Threat," and "Threat of Genetic Contamination" in the text. Similarly, in Tables 3 and 4, the columns should be labelled more clearly. It is not apparent what the values under the 'Genetic' and 'Neurobiological' columns indicate, as there is no reference to these values in the text. As well, the tables are labelled "genetic" and "neurobiological", but the text contains no reference to the "neurobiological" term. This causes confusion with interpreting the findings.

**We thank Reviewer #2 for these careful observations. We have now changed the text in the Tables to match the manuscript text. We believe that this will result in ease of interpretation for the reader:

(p. 40): In Table 2, we have now changed "Attribution" to "Symbolic Threat", "Social-Cognitive" to "Tangible Threat", and "Moral Threat" to "Threat of Genetic Contamination".

(p.42 and 43): In Tables 4 and 5 (formerly Tables 3 and 4), we have kept "genetic" as "genetic" and now changed "neurobiological" to "non-genetic".

(p.42): In Table 4, we have now indicated that the values under "genetic" and "non-genetic" represent "proportion of recalled statements by statement category."

(p.43): In Table 5, we have now indicated that the values under "genetic" and "non-genetic" represent "means and standard deviations of the number of correct responses, percentage of contamination-relevant errors (reversed), and sensitivity to contamination content, by explanation type (genetic vs. non-genetic)."

11a) Sampling and Generalizability: Sample size is an important feature of research aiming to make inferences about a population from a sample. In this case, the authors are focused on making inferences about the Chinese-American population. Study 1 had 56 Chinese-American participants and Study 2 had 85 participants, including 48 Chinese-Americans. In the manuscript, the authors did not comment on how the size of these samples affected the internal and external validity of their studies. I also expected to see some reflection on the unequal sample size for Chinese-Americans (n = 56) and European-Americans (n = 589) in Study 1.

**Regarding internal validity, we have added the following statements for Study 1 and 2, especially as pertaining to null findings within each study. The statement for Study 1 specifically addresses the unequal sample sizes:

Study 1 (p. 18) (Limitations Section): Second, our null findings (i.e., for intimate social distance) may be due in part to the unequal size in groups, as power to detect significant differences would have been greater had groups been more balanced in size. However, we remain fairly confident in the null results as power was still adequate to detect even a small effect size.

Study 2 (p. 26) As another possibility, due to the relatively small sample size in Study 2, we cannot be as confident about our null findings as power was only adequate to detect a medium-to-large effect size (i.e., even a medium effect size would be interpreted as a null finding).

**Regarding external validity, we have added the following statements for Study 1 and 2:

Study 1--(p.23): Third, the low response rate and nonprobability nature of the Chinese-American supplementary sample precluded application of weights, thus limiting generalizability of our findings to this group nationally. However, this group, while not nationally-representative, was still community-ascertained and thus was superior to a convenience sample.

Study 2 (p. 27): A final limitation is that we sampled a convenience sample of college students; results therefore might be generalizable only to this group.

11b) As well, the authors did not report power calculations (either a priori or post hoc).

**We now include brief apriori power calculations sections for Study 1 and Study 2:

Study 1 (p.11): With a sample-size of 56 Chinese-Americans and 589 European-Americans, with *alpha* set at .05, we have 80% power to detect an estimated effect size difference (*Cohen's D*) of .22 in our dependent variables, which is considered a small effect size (Cohen, 1988).

Study 2 (p.23) With a sample-size of 48 Chinese-Americans and 37 European-Americans, with *alpha* set at .05, we have 80% power to detect an estimated effect size difference (*Cohen's D*) of .62 in our dependent variables, which is considered between a medium and a large effect size (Cohen, 1988).

11c) Moreover, in Study 1, the authors did not report weighting the survey data to correct for disproportionate sampling.

**As above in 11a), because of the low response rate and nonprobability nature of the Chinese-American supplementary sample, we are not able to apply weights, thus limiting generalizability of the Chinese American sample to this group nationally. We have added the following sentences to indicate this:

(p.23) "Third, the low response rate and nonprobability nature of the Chinese-American supplementary sample precluded application of weights, thus limiting generalizability of our findings to this group nationally. However, this group, while not nationally-representative, was still community-ascertained and thus was superior to a convenience sample."

11d) I respectfully suggest that issues with sampling be given greater attention in the manuscript, especially in light of some findings that appear rather spurious (e.g., effect of culture on intimate social distance).

Limitations: The methodological limitations and their impact on internal/external validity need to be described in the manuscript.

**We thank Reviewer #2 for these comments and believe we have addressed these points in Comments #11a-11c).

Minor Problems

12) -Is Figure 1 adapted from another source and/or someone else's work? If so, a citation is required.

**Figure 1 is an original figure and we therefore have not added a citation.

13) -In describing the participant characteristics for Study 1, the authors indicate that Table 1 provides "political view"; however, this is not present in the table. In addition, immigrant status is included in Table 1, but is not found in the list of variables within this section.

**We clarify that we do not include "Political View" in Table 1 because we do not have national averages from the 2000 Census for this variable. We also make Table 1 consistent with the text by describing "immigrant status" as "percent foreign-born" in both the text and Table 1. These sentences now read:

(p. 8): "Demographic characteristics for the Chinese-American and European-American samples include gender, age, education, percent foreign-born, household income, political view and religion. Table 1 lists these characteristics (with the exception of political view); selected variables are compared with nationally representative data (U.S. Census Bureau, 2000)."

14) -Table 1 should indicate standard deviations for average age.

**We have now included standard deviations for average age for Study 1 (Table 1; p. 39) and Study 2 (Table 3; p. 41).

15a) -In Study 1 and Study 2, the authors should describe how the dependent variables are scored. I assume a total average is used?

**We now clarify the scoring of dependent variables for Study 1 and 2:

Study 1--(p. 10): All items were scored as single items, with the exception of social distance, which was scored as the average of summed scale items.

Study 1-(p.12): Results for social restriction (scored as single items) reveal that Chinese-Americans were more likely to endorse that people with mental illness should not get married and should not have children. For intimate social distance (scored as the average of three items), Chinese-Americans were more likely to endorse that they were less willing to date, marry, or have a baby *with the sibling of a person* with mental illness.

Study 2-(p.22) Proportion of recalled statements per statement category was analyzed for the recall task.

Study 2-(p. 23): Means for each type of recognition outcome were analyzed for the recognition task.

15b) They should also describe how missing data were handled.

**Missing data was handled differently in each study. For Study 1, because it was a national survey with a sufficient sample size, imputation of some variables for missing values was possible. Missing data for continuous sociodemographic variables only were imputed using conditional mean imputation via regression analysis (Allison, 2002) to maximize power during analyses. These procedures took place relatively rarely (i.e., the largest proportion of missing values in any variable was 5.5%). However, if missing values occurred in any of the dependent variables, these cases were dropped from analyses. Missing values occurred equally across the two ethnic groups, and thus did not appear to bias Study 1 results.

In Study 2, any missing values for variables resulted in the case being dropped from analyses.

The relevant sentences read:

Study 1 (p.9-10) Missing data for specific questions was relatively rare (range 0 to 5.5%) and was addressed by conditional mean imputation using regression analysis (Allison, 2002) for continuous sociodemographic variables only. Missing values for any of the dependent variables resulted in that case being dropped from analyses. Case missingness was found to be independent of ethnicity.

Study 2 (p.21) Any missing data for variables in Study 2 resulted in cases to be omitted from analyses.

16) -In Study 1, for the 'Dependent Variables' section (Pages 8-9), I found the description of 'social distance' to be quite confusing. For instance, the authors indicate that the "intimate social distance scale was given to half of the subjects" and that the "intimate social distance from the sibling scale was given to the other half of subjects". Is the first scale the "towards the vignette subject" version? I suggest that the authors try to make this clearer, perhaps by including some sample items in order to make the distinction between the different versions more concrete for the reader.

**We have now simplified the description of the "Social Distance" measures to address this Reviewer's concerns. Rather than including all of the detail regarding how the 3 different versions of the "Social Distance" measures were randomized to groups, we now simply note that the 3 different versions were randomly assigned to respondents, with respondents receiving one scale each. If the reader is interested in further details of this randomization, we refer the reader onto the parent study (AUTHOR, 2005). Also, we now directly illustrate each of the 3 versions of the Social Distance scale (towards a person with mental illness, towards the sibling of a person with mental illness, and towards the child of a person with mental illness) in the text for clarity of each of these versions:

(p.10) **Social distance.** Social distance was measured by a three-item scale assessing willingness to have Jung date/marry/have a baby with a child of the respondent. These three different versions were randomly assigned as a 3-item scale to respondents, with respondents receiving one scale only (see AUTHOR, 2005). The intimate social distance scale (α=.93; n=260) referred to Jung (e.g., "How would you feel about having Jung marry one of your children?"). The intimate social distance from the sibling scale (α=.92; n=212) referred to Jung's sibling (e.g., "How would you feel about having Jung's sibling marry one of your children?") The intimate social distance from the child scale (α=.90; n=173) referred to Jung's child (e.g., "How would you feel about having Jung's child marry one of your children?").

17) -On Page 12 the authors indicate that Chinese-Americans were less willing to ".date, marry, or have a baby with the sibling of a person with mental illness. ." Were there significant differences on each individual item, the total score, or both? This should be clarified. Figure 2 only presents data and statistics pertaining to the total average score. If the authors are indicating that the two groups were significantly different on each item (i.e., date, marry, or have baby) then average scores and statistical contrasts should be included.

**As noted in Comment #15a), we have now noted twice in the text that we are calculating the averages of the social distance scale, not the individual items. Thus, we have not added any new text regarding significant differences for differences across single social distance items.

18) -The author should be consistent with using leading zeros throughout the manuscript.

**We are now consistent in the use of leading zeros. We have utilized leading zeros in all cases except for when reporting: reliability statistics (i.e., kappa) and inferential statistics (i.e., p values).

19) -Hypothesis #2: Effects of Culture on Threat Constructs - At the end of this section, the authors present information about intercorrelations between threat constructs that, though interesting and important, do not speak to the effects of culture on threat constructs. This information should be removed or moved somewhere else more suitable (perhaps create a new section).

**We have done as this Reviewer has suggested and moved this section on intercorrelations between threat constructs to a new section altogether. This is addressed above in Comment #7.

18) -Page 17, Line 42: Should be "lessen" not "lesson"

**We have changed this sentence to now read:

(p.17) The nonsignificant findings concerning controllability may be due to an emphasis on social causation among Chinese, which might lessen perception of individual responsibility for mental illness (AUTHORS, 2004).

21) -In the General Discussion, the authors state that "We identified perpetuation of the family lineage via marriage as a fundamental everyday interaction among many Chinese groups that appeared to explain unique cultural variation in study" (Page 24, Lines 35-40). It is unclear what the authors are referring to with this statement. Do they mean that they identified this prior to their study, in that they hypothesized that family lineage may explain unique cultural variations. Or, do they mean that they identified this after the study, in that the results confirmed it? This should be clarified.

**We did in fact mean that we apriori identified family lineage as a threat and that this indeed subsequently predicted cultural variation in stigma between the two groups. This sentence now reads:

(p.27) "Based upon seminal anthropological work, we apriori identified perpetuation of the family lineage via marriage as a fundamental everyday interaction among many Chinese groups, which subsequently explained unique cultural variation in stigma."

Reviewer #3:

22a) Although there were ethnic group differences in the two studies, a cultural basis of these differences is inferred but not directly tested.

**This Reviewer's comment is tied to Comments #22d (Reviewer #3) and #30 (Reviewer #4), below. Please see Comments #22d and #30 below where this comment is fully addressed.

22b) The introduction suggests that mental illness may threaten face among Chinese groups, yet a measure of face was not included in either study.

**We have now deleted mention of 'face' in the Introduction, as this Reviewer is correct in that we do not assess 'face' in either Study 1 or 2. However, 'face' is an important Chinese cultural construct which might be examined in future studies. We thus add a sentence describing how future consideration of 'face' might be tied to 'what matters most' among Chinese groups:

(p.28-29) "Further, while preservation of lineage appears to form a central aspect of 'what matters most' among Chinese groups, other core cultural concepts, such as 'face' (AUTHORS, 2008) might be closely linked, and incorporated, with lineage concerns."

22c) A measure of acculturation was included in Study 2, yet it does not appear to have been analyzed in the results. If culture is the basis of the ethnic group differences, acculturation would be expected to moderate the results. Without a direct test of the effects of culture, the group difference could be a function of some other variable, such as knowledge about or personal experiences with mental illness.

**In the revised manuscript, acculturation was analyzed (p. 25) and no significant effects were found. To test acculturation as a potential moderator we switched to regression as recommended by Aiken & West (1991). We conducted a linear regression in which recall for lineage statements was regression on ethnicity, explanation for illness type, acculturation, and the interactions of these variables. Acculturation was mean-centered. The results of three-way interaction between ethnicity, condition, and acculturation revealed no significant effect of acculturation for recall, beta=.43, t(76) =.36, p=.72. Analysis was repeated for each recognition variable and no significant effects emerged. In sum, acculturation did not moderate our results despite Chinese participants scoring higher on the Chinese acculturation scale than European-American participants.

Although Reviewer 2 expected acculturation to moderate our results, there are several plausible explanations for why it did not. Acculturation measures in psychology research tend to focus on affect ("I am proud to be Chinese") which may not capture cultural behaviors that would moderate concerns about potential danger to lineage. As another possibility, due to the relatively small sample size in Study 2, we cannot be as confident about our null findings as power was only adequate to detect a medium-to-large effect size (i.e., even a medium effect size would be interpreted as a null finding). In sum, whether acculturation moderates our effects remains an open question requiring larger samples and a broader range of methods to assess acculturation. We now include all an extensive discussion of acculturation in Study 2 discussion (p. 26).

Finally, unfortunately, we did not assess knowledge about or personal experiences with mental illness in Study 2, and thus are unable to account for its potential moderating effects.

The relevant passages regarding this response now read:

(p.25) *Chinese acculturation.* To test acculturation as a potential moderator we switched to regression as recommended by Aiken & West (1991). We conducted a linear regression in which recall for lineage statements was regressed on ethnicity, explanation for illness type, acculturation, and the interactions of these variables. Acculturation was mean-centered. Analyses revealed no significant effect of acculturation for recall, *p*>.3. Analyses were repeated for each recognition variable and no significant effects emerged, all *p*s>.3.

(p. 26) Study 2 has several limitations. Namely, acculturation did not moderate our results, despite Chinese participants scoring higher on the Chinese acculturation scale than European-American participants. On one hand, one might expect memory effects to be moderated by acculturation. Alternatively, acculturation measures which tend to focus on affect ("I am proud to be Chinese") may not capture cultural behaviors that would moderate concerns about potential danger to lineage. It is also possible that threat to genetic contamination is distinct from acculturation constructs which have typically been associated with cultural psychological research (Kleinman, 1988).

22d) Similarly in Study 2, there is an inference that people are more attuned to information that they are threatened by, but there is no direct measurement of threat or stigma. These mechanism issues should be addressed directly (e.g., analyze the effects of acculturation on the dependent variable) or acknowledged as limitations of the studies.

**We have addressed the possible role of acculturation as a moderator, and acknowledged any limitations regarding this issue in Comment #22c). This Reviewer is also accurate in pointing out that we do not directly address threat; rather we utilize memory (recall and recognition) as an indirect measure of threat. We thus directly state this indirect assessment, as well as acknowledge this limitation for Study 2. The relevant sentences read:

(p.19) "Accordingly, in Study 2 memory was used to indirectly assess threat."

(p. 26-27) "Another potential limitation is that it would have been desirable to directly assess threat (instead of using memory as a proxy) and the degree to which respondents attributed mental illness to genetic causes as a result of the vignette condition."

23) On p. 23, it appears that "not" should be deleted from this sentence: "In the genetic vignette condition, Chinese were not both more likely to spontaneously recall and to recognize statements about transmission of illness when compared with European-Americans."

**We thank this Reviewer for pointing this out. The revised sentence now reads:

(p.26): In the genetic condition, Chinese were both more likely to spontaneously recall and to recognize statements about genetic contamination through marriage when compared with European-Americans.

Reviewer #4:

Organization and Presentation

24) [EDITOR'S NOTE: In notes to our desk, the reviewer stated that the paper "reads like the author is putting in his/her dissertation stuff, without much organization"]

The paper presents findings from two studies. There is repetition in the pattern of methods-results-discussion. The description of the quasi-experimental design is minute, tedious and probably the paper is lengthier than it needs to be. There is a need to re-organize the passages in a clearer and more compact way so that readers will not get lost. I enjoyed the literature review part, but after that I struggled very hard to retain focus and comprehend. It has also taken me much time flipping between pages to understand what is being said.

… The parts on hypotheses generation, differentiation and testing are tedious and difficult to follow.

**We have made a concerted effort to address Reviewer #4's comments by streamlining and reorganizing the text, particularly in the quasi-experiment (Study #1). We have cut approximately 500 words from the text of Study 1, primarily from the description of the Methods section (i.e., administration of the vignettes, and measures descriptions). We intend these changes to simplify the text to make it more readable.

These edits also include the following changes commented upon in other sections:

Comment #10)—Changing the labels in Tables 2, 4 and 5 to match the text; adding text at the bottom of the tables to facilitate identification of the values in the tables

Comment #13)—Changing the labels in Tables 1 to match the text

Comment #16)—Simplifying description of the randomization procedure for the Social Distance measure and clarifying each version of this measure with examples to make reading less tedious

Comment #27)—Adding a footnote explaining what Models 2- Model 6 are to make following the results in the text easier to follow.

25a) However, there are also places where the narrative is too brief. For example, a) is the second study designed to build on the first? How were they related?

**Reviewer 4 suggested we make more explicit how Studies 1 and 2 are related. We now include a more extensive discussion of the relationship between the studies in the manuscript (pp. 19-20). Study 1 used survey methods to identify one specific threat processes that underlies greater mental illness stigma among Chinese groups; namely, threat or concern of genetic contamination of family lineage. Heightened perceptions of 'symbolic' and 'tangible' threat,

along with threat of genetic contamination, substantially mediated the effect that ethnicity had upon stigma for the two social restriction outcomes and fully explained differences in 'intimate social distance towards the sibling'.

While Study 1 focused on the *relationship* between threat of genetic contamination and stigma, Study 2 sought further evidence that threat or concern of genetic contamination of family lineage was more important for Chinese groups than European-Americans. We examined whether Chinese groups were attuned to and remember information about a mental illness when it could potentially taint one's family lineage through genetic contamination. We argued that genetic defects may pollute family lineage, which should heighten threat among Chinese groups. People tend to show greater memory for information they are threatened by (Yiend & Mathews, 2001). Accordingly, in Study 2 memory was used to indirectly assess threat. In sum, Study 2 is a direct extension of Study 1.

This text now reads:

(p.19) "Study 2 was a laboratory experiment. We examined whether Chinese groups are attuned to and remember information about a mental illness when it could potentially taint one's family lineage through genetic contamination. We argue that genetic defects may pollute family lineage, thus heightening threat among Chinese groups. People tend to show greater memory for information they are threatened by (Yiend & Mathews, 2001). Accordingly, in Study 2 memory was used to indirectly assess threat. One advantage of memory measures is that they are not susceptible to biases found in self-report measures.

Chinese and European-American groups were provided a vignette character (Jung) who, soon to marry his fiancé, becomes increasingly concerned about his mental illness symptoms. In the vignette, physical dangerousness (i.e., tangible threat), and danger to society through the person's behavior (i.e., symbolic threat) remained constant across conditions. A doctor explained the cause of the protagonist's illness as genetic or not genetic. Thus, a diagnosis that could raise concerns about family lineage varied between conditions. The experiment was a 2 (culture: Chinese, European-American) × illness explanation (genetic, non-genetic) between-subjects design.

The vignette included two types of statements that remained identical across illness explanation condition. Some statements described the vignette character's illness symptoms (e.g., "thinks people on TV are sending messages to him"). We also integrated new statements relevant to genetic contamination through marriage (e.g., "feared his illness might be passed onto future generations"). If Chinese groups are especially sensitive to concerns about preserving family lineage, then Chinese groups in the genetic-cause condition should be more attuned to information relevant to genetic contamination than in the non-genetic cause condition. No differences between conditions should be found among European-American participants.

To test this, we assessed memory for vignette content using both a free-recall task (Cacioppo & Petti, 1981) and a recognition-comprehension task (true-false) (Woike et al., 1999). We predicted that genetic explanations but not non-genetic explanations would increase memory for statements relevant to genetic contamination for Chinese groups. No differences should be found among European-American participants. Further, we predicted that for both Chinese and European-Americans, genetic explanations would have no effect on memory for statements related to illness symptoms."

25b) p.3 the 'tangible' threat pathway has been supported by two separate path analyses'; what are they (the two pathways)?

**We have now dropped this sentence from the text because it was unclear.

26) A twice cited reference (Wonpat-Borja et al., 2012) is missing.

**This citation has now been added to the references:

Wonpat-Borja, A., Yang, L.H., Phelan, J., Link, B.(2012) Eugenics, genetics, and mental illness stigma in Chinese-Americans. *Social Psychiatry and Psychiatric Epidemiology*,47, 145-156.

27) In Table 2, there is no illustration/footnote of what Model 2-Model 6 are. It is difficult to follow the results in the text in reference to the table.

**We have added a footnote explaining what Models 2- Model 6 (Table 2) are in order to make the results in the text easier to follow. This text now reads:

(p.40): "Notes: Model 1= Ethnicity entered controlling for vignette set (#1 vs. #2) and vignette disorder (SCZ vs. MDD); Model 2= Adding significant sociodemographic covariates only to Model 1; Model 3= Adding threat of genetic contamination variables to Model 2; Model 4= Adding symbolic threat variables to Model 2; Model 5= Adding tangible threat variables to Model 4; Model 6= Adding threat of genetic contamination variables to Model 5."

28) In Table 3-4, again there is no illustration/footnote of "genetic" and the "neurological", whether that refers to the two vignettes or the item variable(s).

**As mentioned above in Comment #10), we have now changed the labels for Tables 4-5 (formerly Tables 3-4) to match the text. Both now label the experiment conditions as "genetic" vs. "non-genetic" (formerly, "neurobiological"). (p. 42-43).

29) The measurement variables for tangible threat and threat of genetic contamination are more

straightforward and clearer than symbolic threat. I do not quite understand how the question items on blame and anger are proximal to this construct of symbolic threat. If it has been used before, perhaps more explanation is needed for putting it that way.

**We have now added text to further clarify how blame and anger towards people with mental illness reflects threat towards the social order. Key to this formulation is that mental illness poses a threat to societal order. Therefore, if an individual is perceived as having control over getting mental illness, he or she is blamed (and elicits anger) because of the threat that mental illness represents. Prior theorists (Stangor & Crandall, 2000, Crandall, 1995) have conceptualized symbolic threat in this fashion. Our revised sentences now state:

(p.3-4) A "symbolic threat to societal order" proposes that perceiving that one had control over the origin of mental illness leads to blame, which engenders affective (e.g., anger) and behavioral reactions (e.g., punishment) which result in response to the threat that such individuals pose to societal order. 'Symbolic' threat has been formulated in this manner in prior studies (Stangor & Crandall, 2000, Crandall, 1995), and the 'symbolic threat' pathway has been empirically supported by two additional studies (Weiner et al., 1988; Corrigan, 2005).

30a) Problem with Interpretation and Argument

Basically, the author(s) found that there are ethnic differences with regard to the measurement variables and the ethnicity may mediate the effect of stigma. Yet the author(s) went further to argue, because of these differences, for the existence of a cultural-specific construct that mental illness is a threat or contamination to lineage. I am less convinced about that. Although the author(s) mentioned the view is gathered from much field experience on Chinese families, s/he made no explicit connection between the two in this paper. An example is given of HIV-positive relatives buried in separate graveyards so that their evil spirits would not contaminate ancestors and offspring, but obviously that example is specific only to certain Yunan ethnic group who had very different culture (e.g. life, death and illness) from the mainstream population.

**We have addressed Reviewer #4's (and Reviewer #3's, Comments #22a, #22d) important point by explicitly stating that we do not directly test for threat to lineage in our analyses. Instead, we utilize genetic contamination via marriage (and memory) as a proxy variable(s) for threat to lineage. We have added several sentences in the text now indicating this. Additionally, we have added a short paragraph in the concluding "General Discussion" section discussing this as a study limitation and as an area for future study. We also however highlight that our genetic contamination measure explained ethnic differences in stigma in a way consistent with that of a lineage-based threat.

These sentences read:

(p.6) We thereby used threat of genetic contamination through marriage as a proxy measure to infer the existence of a culture-based lineage threat among Chinese-Americans.

(p.6) We thus propose that averting threat to the future lineage, as operationalized by the threat of genetic contamination, may be heightened among Chinese-Americans, but not European-Americans.

(p.26-27): Another potential limitation is that it would have been desirable to directly assess threat (instead of using memory as a proxy) and the degree to which respondents attributed mental illness to genetic causes as a result of the vignette condition.

(p.28) While we based our identification of 'threat to lineage' upon extensive prior anthropological fieldwork (AUTHORS, 2008), we did not directly test for lineage concerns as 'what matters most' among Chinese groups. This did not allow direct testing of whether lineage concerns differed among Chinese vs. European-Americans. Nor did we explicitly test whether a threat to lineage among Chinese groups caused greater mental illness stigma (although this is examined in a companion qualitative paper—see AUTHORS, in review). We instead infer the existence of this culture-based lineage threat among Chinese-Americans by using threat of genetic contamination as a proxy measure. Notably, the threat of genetic contamination measure explained ethnic differences in stigma in Studies 1 and 2 in a way consistent with that of a lineage-based threat. However, future studies might even more explicitly identify and test the effects of threat to lineage among these ethnic groups.

30b)…As a support to the lineage thesis, the author quoted the 11 country study where Mainland Chinese are most keen to carry on the family name. However, that is more a social and policy issue instead of a cultural issue when you take into consideration the late approved age for marriage and the one-child policy. I would welcome a stronger support for the lineage argument.

** We agree with the author's assessment regarding the 11-country study and thus dropped this sentence from the text. We believe that we have in part addressed Reviewer #4's comment above in Comment #30a by making explicit that we based our identification of 'threat to lineage' via prior seminal anthropological fieldwork and do not directly test for this construct in our studies (instead using "threat to genetic contamination" as a proxy variable).

To further support our "threat to lineage" thesis among Chinese groups, we have added two more supporting sentences and citations from seminal ethnographies on Chinese culture and social dynamics (Kipnis, 1997; Yan, 2003). Given space constraints, we were not able to add more supporting literature—however, we would be happy to do so if the Reviewer wishes.

These new sentences read:

(p.5) Accordingly, the activities that determine one's status as a 'full adult' member revolve around an individual's engagements to continue one's lineage to extend into perpetuity (Kipnis, 1997). For ensuing generations, there are obligations to produce offspring and to cultivate the lineage's reputation (Yan, 2003).

31) On the other hand, the differences are not difficult to explain in terms of the differences of the samples. The European Americans are significantly older, and it is probable that they had near-to-adult children, and were therefore less sensitive to offspring issues; whereas the Chinese Americans had younger children, and could therefore have been more sensitive to possible or imagined threats to their non-adult children. The overt over-representation of Christians among the European-Americans may also make them more accepting of the ill and insane, whereas the non-religious preference or Buddhist (26.8%) may indicate that one is more responsible for his/her own state. Hence I am less certain if you can argue it is this cultural threat to lineage that caused the (statistical) differences.

**Reviewers #2 (Comment #9b) and Reviewer #4 suggested that our hypothesized differences in culture (i.e., threat or concern about genetic contamination of family lineage) could be explained in terms of differences in samples between Chinese groups and European-Americans. While this is a plausible alternative explanation, we took several analytic and methodological steps to address this explanation. First, in Studies 1 and 2 (see text below), we controlled for all socio-demographic variables and controlling for these variables did not significantly change the results for either study. Second, between studies Chinese and European-Americans groups differed in different ways. For instance, in Study 1, European-Americans were older and more Christian which Reviewer 4 argued could account for differences in our findings. Yet in Study 2, there were no differences in age or religion. In Study 2, instead, Chinese groups had higher levels of education and less income, two variables that are unrelated to concern about genetic contamination. Third, when designing the studies, we intentionally sought to use a community and convenient sample because two different samples make for a more rigorous test of our hypotheses (especially when one is a young urban sample of Chinese college students from New York). Study 1 included a community sample; Study 2 a convenient sample of college students in New York City. Yet the pattern of effects are strikingly consistent.

We have added text in Study 1 and 2 to address these points. These passages now read:

Study 1-(p.18)—"Despite its strengths, Study 1 is not without limitations. One limitation is the sample. European-Americans were older and Christian. It is possible that European-Americans had adult children which would lessen their sensitivity to offspring issues and Christianity may have increased their tolerance to the mentally ill (Gray, 2001). This limitation is balanced by socio-demographic variables being controlled for in all analyses."

Study 2- (p23) "When comparing the Chinese-American and European-American groups, the Chinese-American sample was lower in income [$t(75)=2.83$, $p=.006$], more highly educated [$t(75)=2.86$, $p=.005$], and more conservative [$t(75)=5.26$, $p<=.000$] than the European-American sample. Likewise, Chinese-Americans and European-Americans differed by endorsed religion ($\chi2(7)=19.16$, $p=.008$; Table 2). Controlling for each demographic variable above in recall and recognition analyses did not significantly change reported results. Moreover, none of the variables emerged as a significant covariate in recall and recognition analyses and thus are not discussed further."

(p26)—"That our experiment utilized random assignment and we found no effects of sample characteristics on dependent variables increases our confidence that effects are not explained by sample differences."

Again, we are grateful for the Reviewer's helpful comments. We also are grateful for the opportunity to revise this manuscript and look forward to hearing a decision from you.

Research Highlights

- Extend a threat framework to include cultural components to explain cultural variations in stigma

- Identify threat processes of genetic contamination that underlie greater stigma among Chinese

- Provide evidence from an experimental memory task to identify this culture-specific threat

- Guide anti-stigma interventions by targeting culture-specific perceptions of threat in Chinese

- Provide a novel framework to test how culture-specific forms of stigma work in other cultures

Abstract

We incorporate anthropological insights into a stigma framework to elucidate the role of culture

in threat perception and stigma among Chinese groups. Prior work suggests that genetic

contamination that jeopardizes the extension of one's family lineage may comprise a culture-

specific threat among Chinese groups. In Study 1, a national survey conducted from 2002-2003

assessed cultural differences in mental illness stigma and perceptions of threat in 56 Chinese-

Americans and 589 European-Americans. Study 2 sought to empirically test this culture-specific

threat of genetic contamination to lineage via a memory paradigm. Conducted from June to

August 2010, 48 Chinese-American and 37 European-American university students in New York

City read vignettes containing content referring to lineage or non-lineage concerns. Half the

participants in each ethnic group were assigned to a condition in which the illness was likely to

be inherited (*genetic condition*) and the rest read that the illness was unlikely to be inherited

(*non-genetic condition*). Findings from Study 1 and 2 were convergent. In Study 1, Culture-

specific threat to lineage predicted cultural variation in stigma independently and after

accounting for other forms of threat. In Study 2, Chinese-Americans in the genetic condition

were more likely to accurately recall and recognize lineage content than the Chinese-Americans

in the non-genetic condition, but that memorial pattern was not found for non-lineage content.

The identification of this culture-specific threat among Chinese groups has direct implications

for culturally-tailored anti-stigma interventions. Further, this framework might be implemented

across other conditions and cultural groups to reduce stigma across cultures.

Keywords: Chinese; Stigma; Attitudes; Mental Illness; Social Cognition; Culture; Threat;

Stereotypes

"Chinese people say, 'If she is crazy and not yet married, and if you tell others she is sick, no one will marry her.' This person is someone who has no future. It's as if she has died." –

Chinese Immigrant Sister of individual with schizophrenia

Mental illness stigma has been described as especially pervasive and severe in Chinese groups (AUTHORS, 2008). Chinese groups have consistently endorsed more severe negative stereotypes and social restriction towards people with mental illness (AUTHOR, 2007). Such intensified stigma results in damaging internalization of stereotypes, concealment of illness, and other harmful psychological outcomes (Lee, 2005). Stigma threatens adherence to treatment and makes sustained reintegration into society difficult (Lee et al., 2006). Yet the cultural mechanisms that underlie the heightened mental illness stigma among Chinese groups when compared with Western groups (AUTHOR, 2007) remain unexamined. We utilize cultural anthropological insights into Chinese society to identify and empirically test cultural constructs that may explain these group differences. Specifically, we assess whether the extension of one's family lineage through marriage and making it prosper in perpetuity (Kleinman & Kleinman, 1993) represents such a novel mechanism. We examine this via two studies offering different methodological strengths—a national vignette study and a laboratory experiment.

Mental Illness Stigma Framework

Goffman (1963) proposes that the stigmatized person is reduced "from a whole" person to a "tainted, discounted one." People in a given social context may attach negative stereotypes to mental illness that may differ from the actual characteristics of a person, of which dangerousness is considered central (Jones et al, 1984). The present research builds on a motivational framework that assumes that accurate perception of potential threat is inherent to survival (Stangor & Crandall, 2000). Mental illness stigma accordingly develops from a

universally-held motivation to avoid danger that manifests through two distinct sources of threat (see non-highlighted portions of Figure 1). The first—an instrumental, 'tangible threat' to individuals—"threatens a material or concrete good, such as health and safety" (Crandall & Moriarty, 1995, p.74). The second—'symbolic threat'—threatens the vitality of society via endangering "ideology, and an understanding of how the social, political, and/or spiritual worlds work" (Crandall & Moriarty, 1995, p.74). This classification has identified two pathways to predict mental illness stigma.

INSERT FIGURE 1

Tangible threat. Representations of physical dangerousness comprise one 'tangible' threat via perceived peril to one's physical safety. Corrigan et al. (2001a, 2005) demonstrated in two studies that perceived dangerousness directly engenders affective reactions of fear, which then predisposes behaviors such as social distancing and rejection.

Symbolic threat. In parallel, attributions of responsibility (Weiner, 1985)—by implying an individual's volitional role in causing a stigmatizing condition—constitute a second threat. A 'symbolic' threat exists in that a lack of restraint by the individual in acquiring mental illness threatens the ethical order of society (Stangor & Crandall, 2000). A "symbolic threat to societal order" proposes that perceiving that one had control over the origin of mental illness leads to blame, which engenders affective (e.g., anger) and behavioral reactions (e.g., punishment) which result in response to the threat that such individuals pose to societal order. 'Symbolic' threat has been formulated in this manner in prior studies (Stangor & Crandall, 2000, Crandall, 1995), and the 'symbolic threat' pathway has been empirically supported by two additional studies (Weiner

et al., 1988; Corrigan, 2005). Finally, three studies showed separate effects of 'tangible' and 'symbolic' threats, suggesting independent pathways (Crandall & Moriarty, 1995; Feldman & Crandall, 2007; Corrigan, 2005).

Mental illness stigma thus draws conceptual roots from apparently 'universal' motivations to avert physical and symbolic threat. This framework may also predict differences in mental illness stigma via varying endorsement in levels of 'tangible' and 'symbolic' threats across different cultures. However, distinct cultural groups are also viewed as varying in their subjective interpretations of what mental illness is seen to threaten most (AUTHORS , 2007). We thus extend this 'universal' threat framework to evaluate distinct cultural components to help explain cultural differences in mental illness stigma.

Tangible Threat, Symbolic Threat and 'Threat to Family Lineage' among Chinese-Americans

Because stigma has been shown to manifest in distinct ways within Chinese culture (AUTHORS, 2008), we identify the example of Chinese groups to illustrate how relevant cultural domains might be incorporated into this stigma threat model. This 'cultural component' might include the beliefs, values and practices held by a group, which also includes the individual's role in negotiating values held by social worlds (Greenfield, 1997). Using an anthropological perspective, we identify a new cultural construct—threat to family lineage through genetic contamination via marriage—that may account for heightened stigmatizing attitudes among Chinese groups.

Starting from the original 'universal' threat framework, elevations in tangible and symbolic threats may partially account for higher mental illness stigma among Chinese-American groups. First, enduring Confucian traditions emphasize self-cultivation via moderate behavior (Fei, 1992). Because common mental illness stereotypes of dangerousness and

unpredictability directly challenge cultural norms of restrained behavior, heightened perceptions

of dangerousness may lead to increased fear and stigma outcomes (social distance and

restriction). This represents increased tangible threat. Regarding 'symbolic' threat, a person's

lack of self-restraint is especially threatening to social order because it indicates a breakdown by

the family and society in providing guidance (Fei, 1992). Chinese groups may thereby attribute

mental illness to an individual's lack of cultivation, thus initiating greater perceptions of

responsibility, resulting in blame and anger, which predispose stigma outcomes. Accordingly, we

first hypothesize that Chinese-Americans will be more likely than European-Americans to

distance themselves from people with mental illness and their family members. Second, we

hypothesize higher levels of tangible and symbolic threat among Chinese-Americans.

But in solely considering these forms of stigma threat, a core cultural dynamic intrinsic to

many Chinese groups is missing. As identified by seminal ethnographies (AUTHORS, 2008),

one key social motivation is to extend one's family lineage and to make it prosper (Kleinman &

Kleinman, 1993). To continue one's lineage into perpetuity—thus assuring placement into "an

eternal chain of filial children" (Stafford, 1995, p. 86)—permeates everyday interactions.

Accordingly, the activities that determine one's status as a 'full adult' member revolve around an

individual's engagements to continue one's lineage to extend into perpetuity (Stafford, 1995).

For ensuing generations, there are obligations to produce offspring and to cultivate the lineage's

reputation (Yan, 2003). Corroborating quantitative findings stem from Taiwanese subjects also

scoring highest on 'temporal farsightedness'— that one's actions both result from ancestral

deeds and affect future generations—among all ethnic groups studied (Chia et al., 1994). We

thus identify as a core Chinese cultural construct the ways that stigma can taint the future family

lineage. We conceptualize this culture-specific component as partially overlapping the other two

threat constructs, but also contributing distinct variance in predicting stigma (Figure 1).

Because lineage is perpetuated through marriage, we propose that mental illness stigma

in Chinese-Americans will pose a threat via suspected psychiatric history in the family ancestry

and the genetic make-up of marriage candidates (Wonpat-Borja et al., 2012). We thereby used

threat of genetic contamination through marriage as a proxy measure to infer the existence of a

culture-based lineage threat among Chinese-Americans. In contrast among many European-

Americans, individualism—or the emphasis on freedom to exercise choice dating back to the

1800's (de Tocqueville, 1832)—promotes an autonomous individual worldview. Many such

individuals are thus motivated to view the self as composed of unique, internal attributes

(Markus & Kitayama, 1991) unlinked to past or future generations (Chia et al., 1994). We thus

propose that averting threat to the future lineage, as operationalized by the threat of genetic

contamination, may be heightened among Chinese-Americans, but not European-Americans.

Thus, our third hypothesis states that this culture-specific construct will contribute unique

variance in predicting stigmatization among these two groups.

Study 1

Study 1 utilizes a preexisting epidemiological sample of Chinese-Americans and

European-Americans obtained from a national telephone vignette survey. Each respondent was

presented one vignette describing a person with symptoms of mental illness (depression or

schizophrenia; adapted from the 1999 General Social Survey, AUTHOR, 2005). Including

depression and schizophrenia suited Study #1 by enabling examination of stigma towards mental

illness generally.

We propose three sets of hypotheses comparing Chinese-Americans vs. European-Americans:

1) Hypothesis #1 predicts that Chinese-Americans will show elevated stigma outcomes (hereafter, we refer to 'stigma outcomes' as 'stigma') via: a) social restriction towards marriage and childbearing and b) intimate social distance towards people with mental illness and their family members (i.e., sibling or child).

2) Hypothesis #2 predicts that 'tangible' threat, 'symbolic' threat, and threat of genetic contamination--operationalized by introducing a) mental illness and b) pathogenic genes into one's family lineage via marriage--will be higher among Chinese-Americans.

3) Hypothesis #3 tests how these three threat sources may mediate any cultural variation in stigma (i.e. social restriction or social distance) between groups (Barron & Kenney, 1986). Mediation holds if, after accounting for the effect of one or more threat items on stigma, ethnicity exerts an attenuated or nonsignificant effect on stigma. We first examine the unique contribution of threat of genetic contamination to test its independent effect. To then evaluate the overall threat model's utility, the 'tangible' and 'symbolic threat' constructs are entered first to predict social restriction and social distance, followed by threat of genetic contamination. We hypothesize that threat of genetic contamination will significantly predict cultural variation in stigma independently and after accounting for cultural effects via the other threat constructs.

Method

Sample and Procedures

The study sample consists of a subsample of Chinese-Americans (n=56) and European-Americans (n=589) who participated in a vignette experiment of public attitudes and stigma

conducted from 2002-2003 (see AUTHOR, 2005). After receiving one vignette, respondents responded to questions regarding the vignette character.

Respondents were persons age ≥18, living in households with telephones, in the continental U.S. The sampling frame was derived from a list-assisted, random-digit-dialed (RDD) telephone frame. Telephone interviews, ranging from 20-25 minutes long, occurred between June 2002 and March 2003. While these procedures yielded the entire European-American sample, a non-probability sample of Chinese-Americans (*n*=43) was obtained via ethnic surnames in a national telephone directory to supplement the original RDD sample (*n*=13). Interviews were in English (*n*=38) or Chinese (*n*=18) depending on the subject's preference. Response rates were 24% for the Chinese-American oversample, and 62% for the original RDD group. Study protocols were approved by the institutional review board of [ANONYMIZED] Medical Center.

Demographic characteristics

Demographic characteristics for the Chinese-American and European-American samples include gender, age, education, percent foreign-born, household income, political view and religion. Table 1 lists these characteristics (with the exception of political view); selected variables are compared with nationally representative data (U.S. Census Bureau, 2000). Both samples appear more educated and more female than the national group, which is typical of national surveys (AUTHOR, 2005).

INSERT TABLE 1

The Chinese-American sample was younger [$t(643)=2.80, p<.01$], more highly educated [$t(643)=3.34, p<.001$], and more liberal (1=liberal; 5=conservative) than the European-American sample [2.92 vs. 3.30, $t(643)=2.65, p<.01$]. Likewise, Chinese-Americans and European-Americans differed by endorsed religion ($\chi2(5)=173.47, p<.001$). We control for key sociodemographic variables below.

Measures

Vignettes. This study used two sets of 2 vignettes each: in each set, one vignette described psychiatric symptoms related to schizophrenia (SCZ) and the other vignette described major depressive disorder (MDD). Vignette sets were similar in description of psychiatric symptoms. Sets were created to ensure that hypothesized effects were not due to a specific symptom or vignette description.

Chinese-translated vignettes underwent professional translation and back-translation. The vignette subject's ethnicity was matched to respondents' ethnicity. For simplicity, we present the SCZ vignette from vignette set #1 (for all other vignette versions, see online Appendix)

Vignette #1-Schizophrenia. Imagine a person named Jung. He is a single, 25-year old Chinese-American man. Usually, Jung gets along well with his family and coworkers. He enjoys reading and going out with friends. About a year ago, Jung started thinking that people around him were spying on him and trying to hurt him. He became convinced that people could hear what he was thinking. He also heard voices when no one else was around. Sometimes he even thought people on TV were sending messages especially to him. After living this way for about six months, Jung was admitted to a psychiatric hospital and was told that he had an illness called

"schizophrenia." He was treated in the hospital for two weeks and was then released. He has been out of the hospital for six months now and is doing OK.

Participants were randomly-assigned to vignette set and illness type. Data from both vignette sets #1 (n=472) and #2 (n=173) were combined to maximize sample size. Subjects were randomly-assigned a vignette character with the symptoms and diagnosis of SCZ (n's=28 and 302; Chinese-Americans and European-Americans, respectively) or MDD (n's=28 and 287; total psychiatric condition vignettes, n's=56 and 589). Because of possible effects that vignette set (#1 vs. #2) and psychiatric illness type (SCZ vs. MDD) might have on outcomes, all regression analyses controlled for these variables' effects. Once vignette set and illness type were controlled for, no other vignette manipulations (see AUTHOR, 2005) had an effect on any dependent variable, and are not discussed further.

Dependent Variables

For item wording and response sets of all measures, see Appendix. All items used a 4-point response set with higher scores indicating greater stigma. All items were scored as single items, with the exception of social distance, which was scored as the average of summed scale items.

Stigma Constructs

Social Restriction. Social restriction was measured by two single items assessing agreement whether Jung should not be allowed to marry (not marry) or have children (no children).

Social distance. Social distance was measured by a three-item scale assessing willingness to have Jung date/marry/have a baby with a child of the respondent. These three different versions were randomly assigned as a 3-item scale to respondents, with respondents

receiving one scale only (see AUTHOR, 2005). The intimate social distance scale (α=.93; n=260) referred to Jung (e.g., "How would you feel about having Jung marry one of your children?"). The intimate social distance from the sibling scale (α=.92; n=212) referred to Jung's sibling (e.g., "How would you feel about having Jung's sibling marry one of your children?") The intimate social distance from the child scale (α=.90; n=173) referred to Jung's child (e.g., "How would you feel about having Jung's child marry one of your children?").

Threat Constructs

All respondents received two single-item measures, each with a 4-point response set (see Appendix), to assess each of the three threat constructs.

'Tangible' Threat. Tangible threat was measured by assessing agreement that Jung would be violent (violent) or elicit fear (fear).

'Symbolic' Threat. Symbolic threat was measured by assessing agreement that Jung was to blame for his condition (blame) or would elicit anger (anger).

Threat of Genetic Contamination. Threat of contaminating the genetic purity of the lineage was measured by assessing agreement that knowing a marriage partner's familial history of mental illness is important (history MI) or that genetic screening should be required before marriage (screening).

Power Analyses

With a sample-size of 56 Chinese-Americans and 589 European-Americans, with *alpha* set at .05, we have 80% power to detect an estimated effect size difference (*Cohen's D*) of .22 in our dependent variables, which is considered a small effect size (Cohen, 1988). Missing data for specific questions was relatively rare (range 0 to 5.5%) and was addressed by conditional mean imputation using regression analysis (Allison, 2002) for continuous sociodemographic variables

only. Missing values for any of the dependent variables resulted in that case being dropped from analyses. Case missingness was found to be independent of ethnicity.

Results

Hypothesis #1: Cultural Differences in Social Restriction and Social Distance

We first used independent-sample *t*-tests to compare Chinese-Americans with European-Americans on social restriction and intimate social distance (with Jung, Jung's sibling, and Jung's child conditions) (see Figure 2). Results for social restriction (scored as single items) reveal that Chinese-Americans were more likely to endorse that people with mental illness should not get married and should not have children. For intimate social distance (scored as the average of three items), Chinese-Americans were more likely to endorse that they were less willing to date, marry, or have a baby *with the sibling of a person* with mental illness. No differences were found between ethnic groups on their unwillingness to date, marry, or have a baby with a person with mental illness or their child.

INSERT FIGURE 2

Controlling for Study Design and Sociodemographic Covariates

We next examined the effects of participants' ethnicity on the three outcomes described above (i.e., not marry, no children, and intimate social distance from the sibling) via linear regression models controlling for vignette set (#1 vs. #2) and disorder (SCZ vs. MDD). Chinese ethnicity again increased stigma in all outcomes (Table 2, Model 1 of each three variables).

*** INSERT TABLE 2 ***

Key sociodemographic variables (gender, age, education, family income, political conservatism, and religion) were simultaneously entered into the Model 1 equations to control for any potential confounds. Only significant covariates were included in Model 2 (Table 2); controlling for these covariates (and in particular, age) boosted ethnicity's effect on stigma across all outcomes.

Hypothesis #2: Effects of Culture on Threat Constructs

We next examined whether the three threat constructs were heightened among Chinese-Americans vs. European-Americans.

'Tangible' Threat. Chinese-Americans (n=56, M=2.67, SD=0.91) perceived people with mental illness as more violent than European-Americans (n=589, M=2.30, SD=.76; $t(62.5)$=2.90, p< 0.01). Further, Chinese-Americans (n=56, M=1.95, SD=1.01) perceived that people with mental illness elicited more fear than European-Americans (n=589, M=1.47, SD=0.72; $t(60.5)$=3.47, p<0.001).

'Symbolic' Threat. While Chinese-Americans (n=56, M=1.39, SD=0.73) were slightly more likely to blame people with mental illness for their condition than European-Americans (n=589, M=1.29, SD=0.60), this was not statistically significant ($t(62.4)$=0.99, p>0.10). However, Chinese-Americans (n=56, M=1.32, SD=.71) endorsed more anger towards people with mental illness than European-Americans (n=589, M=1.11, SD=.36; $t(57.7)$=2.14, p<0.05).

Threat of Genetic Contamination. Chinese-Americans (n=56, M=2.70, SD=1.14) were more likely to endorse that genetic screening should be required before marriage than European-Americans (n=589, M=1.89, SD=1.01; $t(643)$=5.60, p<0.001). Further, Chinese-Americans (n=56, M=3.38, SD=0.95) were more likely to stress the importance of knowing a potential

marriage partner's family history of mental illness than were European-Americans (n=589,

M=2.95, SD=0.99; t(643)=3.09, p<0.01).

Intercorrelations between Threat Constructs. Our threat model (Figure 1) describes the

three threat constructs as relatively independent. Items were in fact more highly correlated within

threat domains, with lower correlation between threat domains. As expected, Violent was

correlated most highly with Fear, r(645)=.37, p<.001, with all other correlations between threat

constructs and Violent ≤.15. Similarly, Blame was correlated most highly with Anger,

r(645)=.16, p<.001, with all other correlations between threat constructs and Blame ≤.08 or less.

Finally, History MI was correlated most highly with Screening, r(645)=.39, p<.001, with all

other correlations between threat constructs and History MI ≤.12.

Hypothesis #3: Explanatory Effects of Threat Constructs on Cultural Variation in Stigma

Hypothesis #3 examines the explanatory effects of these three sources of threat. We first

tested whether threat of genetic contamination alone mediated the effect of culture on each

stigma outcome (i.e., social restriction and intimate social distance; Barron & Kenny, 1986).

Next, to test whether the threat of genetic contamination uniquely increased prediction of stigma,

we tested whether these items predicted cultural variation even after accounting for tangible and

symbolic threat.

Threat of Genetic Contamination: Independent Effects

The two threat of genetic contamination items were first entered simultaneously into a

regression model after participant ethnicity and sociodemographic covariates (Model 3, Table 2).

When entered as a block, these threat items significantly explained variance for no marry (2.8%),

no children (5.0%), and intimate social distance from the sibling (10.7%; each p<0.001). If these

threat items at least partially explain ethnicity's effect on stigma, the coefficient for ethnicity

reported in Model 2 (Table 2) should decrease after these items are entered (Model 3, Table 2).

Accounting for threat of genetic contamination, the regression coefficients for ethnicity drop

substantially by 23.9% (0.536 to 0.408) for no marry, 31.1% (0.659 to 0.454) for no children,

and 26.5% (0.720 to 0.529) for intimate social distance from the sibling.

We next examine the distinct explanatory effects of the threat of genetic contamination

on ethnicity after 'symbolic' and 'tangible' threat items are added. These threat constructs are

added sequentially into regression models after entering ethnicity and other significant covariates

(see Model 2, Table 2).

'Symbolic' Threat. Model 4 (Table 2) depicts the mediating effects of the two 'symbolic'

threat items. When entered as a block, these threat items predicted all stigma outcomes (each

$p<.05$). When comparing the coefficients for ethnicity before (Model 2, Table 2) and after

(Model 4, Table 2) 'symbolic' threat items were added, the regression coefficients for ethnicity

drop moderately by 7.1% (0.536 to 0.498) for no marry, 8.5% (0.659 to 0.603) for no children,

and 20.3% (0.720 to 0.574) for intimate social distance from the sibling.

'Tangible' Threat. Model 5 (Table 2) depicts the explanatory effects of the two 'tangible'

threat items on ethnicity with the 'symbolic threat' variables already entered. When entered as a

block, the two 'tangible' threat items aided prediction of all stigma outcomes (each $p<.001$).

When adding violent and fear, the regression coefficients for ethnicity again drop substantially--

33.9% (0.498 to 0.329) for no marry, 26.4% (0.603 to 0.444) for no children, and 42.7% (0.574

to 0.329) for intimate social distance from the sibling. The 'tangible' threat items also appeared

to mediate the effects of the 'symbolic' threat items on two stigma outcomes, with only blame

still significantly predicting no marry.

Threat of Genetic Contamination. We enter the threat of genetic contamination items last

to test if they might explain ethnicity's effect on stigma even after accounting for the 'symbolic'

and 'tangible' threat items. When entered as a block (Model 6, Table 2), the two genetic

contamination threat items explained additional variance for the stigma outcomes of no marry

(1.5%), no children (3.5%), and intimate social distance from the sibling (7.6%; each at $p<0.01$).

The regression coefficients for ethnicity also decreased by a further 25.2% (0.329 to 0.246) for

no marry, 32.4% (0.444 to 0.300) for no children, and 31.3% (0.329 to 0.226) for intimate social

distance from the sibling. Thus, the threat of genetic contamination items powerfully accounted

for ethnicity's effects on stigma even after other threat constructs were entered.

We lastly evaluate our threat model by entering all three threat constructs and comparing

the ethnicity coefficients in Model 2 (without any threat items) to Model 6 (ethnicity's remaining

effect on stigma after all threat items are entered). After entering all threat constructs, the

coefficients for ethnicity decreased by 54.1% (0.536 to 0.246) for no marry, 54.5% (0.659 to

0.300) for no children, and 68.6% (0.720 to 0.226) for intimate social distance from the sibling.

Further, while the final ethnicity coefficient for no children remained strongly significant (at

$p<0.001$) even after entering all threat items (Model 6, Table 2, Section B), adding the genetic

contamination threat items as a final step to Model 5 decreased the significance of ethnicity in

predicting no marry from strongly significant ($p<0.001$) to just significant ($p<0.05$; Model 6,

Table 2, Section A), and for intimate social distance from the sibling from trend significance

($p=0.06$) to non-significance ($p>.10$; Model 6, Table 2, Section C). Thus, the effect of ethnicity

on stigma is substantially mediated by the three threat constructs for no marry and no children,

and fully mediated for intimate social distance from the sibling.

Discussion

Hypothesis #1 showed cultural differences in three of five stigma outcomes that allowed examination of the mediating effects of the threat constructs. Per prior studies (Shookohi-Yekta & Retish, 1991; Furnham & Wong, 2007), Chinese-Americans evidenced more socially restrictive attitudes. Further, there was partial support for hypothesized differences in intimate social distance as Chinese–Americans endorsed more intimate social distance towards the sibling of a person with mental illness. However, ethnic differences in intimate social distance did not extend to the person with mental illness, or that person's child. On the one hand, elevated intimate social distance towards the patient among European-Americans is not surprising given prior findings in another nationally-representative sample (Link et al., 1999). However, that European-Americans endorsed equivalent intimate social distance towards the child of a person with mental illness than did Chinese-Americans was unexpected. One possible explanation is that European-Americans attributed similar levels of genetic transmission of mental illness to children than do Chinese-Americans, but that these beliefs do not extend to siblings. This unanticipated finding requires further investigation.

Hypothesis #2 showed cultural influences on five of six threat items. Like other studies (Furnham & Wong, 2007), 'tangible' threat among Chinese-Americans was endorsed more highly. Further, that threat of genetic contamination was greater among Chinese-Americans corroborates greater concerns of genetic transmission of mental illness in this group (Wonpat-Borja et al., 2012). Regarding 'symbolic' threat, only anger was significantly higher in Chinese-Americans. The nonsignificant findings concerning controllability may be due to an emphasis on social causation among Chinese, which might lessen perception of individual responsibility for mental illness (AUTHORS, 2004).

Our study is the first to identify the specific threat processes that underlie greater mental illness stigma among Chinese groups. Heightened perceptions of 'symbolic' and 'tangible' threat, along with threat of genetic contamination, substantially mediated the effect that ethnicity had upon stigma for the two social restriction outcomes and fully explained differences in 'intimate social distance towards the sibling'. Key to our conceptualization, Hypothesis #3 showed that threat of genetic contamination among Chinese-Americans significantly predicted unique cultural variance in all three stigma outcomes independently, and also after cultural influences via other threats were accounted for.

Despite its strengths, Study 1 is not without limitations. One limitation is the sample. European-Americans were older and Christian. It is possible that European-Americans had adult children which would lessen their sensitivity to offspring issues and Christianity may have increased their tolerance to the mentally ill (Gray, 2001). This limitation is balanced by socio-demographic variables being controlled for in all analyses. Second, our null findings (i.e., for intimate social distance) may be due in part to the unequal size in groups, as power to detect significant differences would have been greater had groups been more balanced in size. However, we remain fairly confident in the null results as power was still adequate to detect even a small effect size. Third, the low response rate and nonprobability nature of the Chinese-American supplementary sample precluded application of weights, thus limiting generalizability of our findings to this group nationally. However, this group, while not nationally-representative, was still community-ascertained and thus was superior to a convenience sample. Lastly, the study's non-experimental design precludes definitive causal inference between concerns about family lineage and stigma, as greater stigma may result in elevated lineage-based concerns. These limitations motivated using a different method and outcome measure to explore whether

genetic contamination via marriage constitutes a culturally-specific form of threat among Chinese groups.

Study 2

Study 2 was a laboratory experiment. We examined whether Chinese groups are attuned to and remember information about a mental illness when it could potentially taint one's family lineage through genetic contamination. We argue that genetic defects may pollute family lineage, thus heightening threat among Chinese groups. People tend to show greater memory for information they are threatened by (Yiend & Mathews, 2001). Accordingly, in Study 2 memory was used to indirectly assess threat. One advantage of memory measures is that they are not susceptible to biases found in self-report measures.

Chinese and European-American groups were provided a vignette character (Jung) who, soon to marry his fiancé, becomes increasingly concerned about his mental illness symptoms. In the vignette, physical dangerousness (i.e., tangible threat), and danger to society through the person's behavior (i.e., symbolic threat) remained constant across conditions. A doctor explained the cause of the protagonist's illness as genetic or not genetic. Thus, a diagnosis that could raise concerns about family lineage varied between conditions. The experiment was a 2 (culture: Chinese, European-American) × illness explanation (genetic, non-genetic) between-subjects design.

The vignette included two types of statements that remained identical across illness explanation condition. Some statements described the vignette character's illness symptoms (e.g., "thinks people on TV are sending messages to him"). We also integrated new statements relevant to genetic contamination through marriage (e.g., "feared his illness might be passed onto future generations"). If Chinese groups are especially sensitive to concerns about preserving

family lineage, then Chinese groups in the genetic-cause condition should be more attuned to information relevant to genetic contamination than in the non-genetic cause condition. No differences between conditions should be found among European-American participants.

To test this, we assessed memory for vignette content using both a free-recall task (Cacioppo & Petti, 1981) and a recognition-comprehension task (true-false) (Woike et al., 1999). We predicted that genetic explanations but not non-genetic explanations would increase memory for statements relevant to genetic contamination for Chinese groups. No differences should be found among European-American participants. Further, we predicted that for both Chinese and European-Americans, genetic explanations would have no effect on memory for statements related to illness symptoms.

Sample and procedures

The target population was students recruited from universities in New York City from June to August 2010 who self-identified as Chinese (immigrants or Chinese-Americans with one parent born in China) or European-American (≥1 parent born in U.S.). Eligible subjects were 48 Chinese and 37 European-Americans. They were compensated $12.00. Participants were randomly-assigned to condition.

After consent, participants were told they would read a story then respond to questions. First, participants read the vignette about a character suffering from schizophrenia. Next, participants completed a distracter task and were then given an unexpected recall task. Following free recall, they completed the recognition task, and finally all additional study measures. Participants were probed for suspicion, using funnel debriefing; none guessed the hypotheses. Study protocols were approved by the institutional review board of [ANONYMIZED] University.

Demographic characteristics

Table 3 provides the Chinese-American and European-American samples'

characteristics, including gender, age, education, place of birth, household income, political view

and religion.

<center>***INSERT TABLE 3***</center>

When comparing the Chinese-American and European-American groups, the Chinese-

American sample was lower in income [$t(75)=2.83$, $p=.006$], more highly educated [$t(75)=2.86$,

$p=.005$], and more conservative [$t(75)=5.26$, $p<=.000$] than the European-American sample.

Likewise, Chinese-Americans and European-Americans differed by endorsed religion

($\chi2(7)=19.16$, $p=.008$; Table 2). Controlling for each demographic variable above in recall and

recognition analyses did not significantly change reported results. Moreover, none of the

variables emerged as a significant covariate in recall and recognition analyses and thus are not

discussed further.

Materials

Vignettes. Because universities educate students about major depression because of its

high prevalence (Kitzrow, 2003), Study 2 included only vignettes describing schizophrenia. As

per Study 1, participants' race/ethnicity was matched to that of the vignette character. Each

vignette (genetic-cause vs. non-genetic cause) contained 12 statements; six statements about the

character's symptoms and thoughts ('symptoms and experiences content') and six statements

related to genetic contamination ('contamination content'). These statements did not vary by

condition.

Experimental manipulation. At the end of the vignette, a geneticist described a "genetic" vs. "non-genetic" etiology of schizophrenia. The 'genetic-cause' condition read, "…his problem had a very strong genetic or hereditary component." The 'non-genetic' cause condition read, "his problem was not due to a hereditary or genetic factor, especially since his family has no history of mental illness."

Measures

Recall. Participants wrote down as many recalled thoughts in 10 empty text boxes (see Cacioppo & Petty, 1981). While our primary interest was recall of statements of genetic contamination and illness symptoms, we analyzed content of all recalled statements without forcing responses into hypothesized categories.

Coding scheme. Each sentence was coded as one response unit which was stripped of any ethnically-identifiable information. Two coders categorized based on emergent themes (κ=.86) and were unaware of hypotheses and condition. The final coding scheme comprised 9 categories (see Table 4 for examples): 1) Concerns about transmitting illness to future children; 2) Character and fiancé's relationship; 3) Fiancé's interest in marrying a healthy man; 4) Character's concealment of illness from fiancé; 5) Character's thoughts about illness; 6) Scientific background about illness; 7) Character's demographic information; 8) Other; and, 9) Uncodable. Proportion of recalled statements per statement category was analyzed for the recall task.

INSERT TABLE 4

Recognition-comprehension. The true-false recognition task included 20 true-false items (Woike et al., 1999) assessing comprehension of statements relevant to genetic contamination of the character's lineage (10 items) and character's illness symptoms (10 items). For each of the 10 statements, five were identical to vignette statements and five were false (i.e., had subtle inaccuracies, e.g. "he suffered for six months" vs. "he suffered for six weeks"). Worse recognition suggested less attention to or poorer comprehension of misrecognized content.

Three outcomes were derived (Woike et al., 1999): (1) "Number of correct contamination-relevant statements" (range: 0-10); (2) Contamination-error-percentage, the number of incorrectly recognized contamination-relevant statements divided by the total number of errors (range 0-100%); and, (3) Sensitivity to contamination-relevant information, the number of correctly-recognized contamination statements (0-10) minus the number of false positives (i.e., false items marked as "true") (range: -5-10). Means for each type of recognition outcome were analyzed for the recognition task.

Chinese acculturation. Participants completed an 8-item measure assessing orientations to Chinese and American cultures (Tsai et al., 2000). Items had a 5-point response set, with higher scores indicating greater Chinese acculturation. Chinese groups scored higher than European-Americans (MChinese=3.80, SD=.64; MEur-Am=1.78, SD=.33; p<.001).

Power Analyses

With a sample-size of 48 Chinese-Americans and 37 European-Americans, with *alpha* set at .05, we have 80% power to detect an estimated effect size difference (*Cohen's D*) of .62 in our dependent variables, which is considered between a medium and a large effect size (Cohen, 1988). Any missing data for variables in Study 2 resulted in cases to be omitted from analyses.

Results

Recall

Participants' recall of vignette information fell into 9 independent, uncorrelated categories (Cronbach's alpha=0.06). None of the eight recall categories correlated at least .3 with any other category, suggesting non-factorability. We thus examined each recall category separately.

We predicted that among Chinese but not European-American participants, recall for information related to potential genetic contamination would be greater when mental illness was described as being caused by genetic vs. non-genetic factors. To test this, a series of culture x explanation type analysis of variances (ANOVAs) were conducted on each category (Table 4). The only category revealing a significant interaction was "concerns about transmitting illness to future children." This ANOVA revealed a main effect of genetic-cause vs. non-genetic cause condition, $F(1,80)=4.30$, $p=.041$ which was qualified by a significant culture $\times$ explanation type interaction, $F(1,80)=4.74$, $p=.032$. No other effects were significant. Among Chinese, when mental illness was described as being caused by genetic factors, recall of statements about illness transmission was greater than when a non-genetic cause was described, $F(1,80)=10.55$, $p=.002$. European-American participants' recall was unaffected by explanation type, Fs<1. Hence, when mental illness etiology included a genetic component, Chinese but not European-Americans recalled information relevant to potential genetic contamination, presumably activated by this culture-specific threat.

Recognition-comprehension

The recognition task assessed how precisely participants remember information in the vignette. Results were consistent with the recall task. Total number of correct *contamination-relevant responses* was analyzed with the same culture $\times$ explanation type ANOVA. Results

revealed a significant interaction, $F(1, 80)=6.08$, $p=.016$ (Table 5). No other effects were significant. Chinese participants were more likely to correctly identify contamination-relevant statements as true when mental illness was ascribed to genetic factors vs. non-genetic causes, $F(1, 80)=4.02$, $p=.048$. For European-Americans, there was no significant difference in recognition between conditions, Fs<1. Examining pattern of errors (i.e., dividing the total number of contamination-relevant errors by the total number of errors) revealed the same pattern of effects ($p<.05$). Further, utilizing the sensitivity measure (d'), which is useful for distinguishing between subjects who chronically respond "true" from those who are uniquely sensitive to contamination-relevant content (Woike et al., 1999), yielded congruent results ($p<.05$).

We next examined performance on the recognition task for content about the character's *symptoms/feelings* about his illness. No differences among Chinese or European-American participants in the total number of correct responses for statements relevant to character's illness experiences were expected. Using a 2×2 ANOVA, no main or interaction effects were significant, all *F*s<1.3.

Chinese acculturation. To test acculturation as a potential moderator we switched to regression as recommended by Aiken & West (1991). We conducted a linear regression in which recall for lineage statements was regressed on ethnicity, explanation for illness type, acculturation, and the interactions of these variables. Acculturation was mean-centered. Analyses revealed no significant effect of acculturation for recall, $p>.3$. Analyses were repeated for each recognition variable and no significant effects emerged, all ps>.3.

Discussion

Study 2 used an experimental memory paradigm utilizing vignettes to directly test a Chinese culture-specific perception of threat. The recall and recognition tasks revealed evidence consistent with Study 1. In the genetic condition, Chinese were both more likely to spontaneously recall and to recognize statements about genetic contamination through marriage when compared with European-Americans. However, they were not more accurate at detecting statements related with symptom experiences. Threats are strong competitors for attention, and consequently, memory for threats would be stronger (Bishop et al., 2004). Study 2 thus is consistent with the hypothesis that Chinese groups experience threats related to family lineage particularly when lineage-relevant information is made salient in their immediate social context. That our experiment utilized random assignment and we found no effects of sample characteristics on dependent variables increases our confidence that effects are not explained by sample differences.

Study 2 has several limitations. Namely, acculturation did not moderate our results, despite Chinese participants scoring higher on the Chinese acculturation scale than European-American participants. On one hand, one might expect memory effects to be moderated by acculturation. Alternatively, acculturation measures which tend to focus on affect ("I am proud to be Chinese") may not capture cultural behaviors that would moderate concerns about potential danger to lineage. It is also possible that threat to genetic contamination is distinct from acculturation constructs which have typically been associated with cultural psychological research (Kleinman, 1988). As another possibility, due to the relatively small sample size in Study 2, we cannot be as confident about our null findings as power was only adequate to detect a medium-to-large effect size (i.e., even a medium effect size would be interpreted as a null finding). Another potential limitation is that it would have been desirable to directly assess threat

(instead of using memory as a proxy) and the degree to which respondents attributed mental

illness to genetic causes as a result of the vignette condition. A final limitation is that we sampled

a convenience sample of college students; results therefore might be generalizable only to this

group. Future research might better address these methodological and study limitations.

General Discussion

Supporting past work comparing mental illness stigma among Chinese vs. Western

groups (Shokoohi-Yekta & Retish, 1991; Furnham & Wong, 2007), Study 1 indicated increased

levels of stigma (i.e., social restriction and intimate social distance) and perception of threat (i.e.,

symbolic, tangible, and threat of genetic contamination) among Chinese groups. Our results

extend prior studies showing independent pathways for symbolic and tangible threats in

predicting stigma by identifying and examining the effects of a 'culture-specific' source of threat

(Crandall & Moriarty, 1995; Corrigan, 2005). Based upon seminal anthropological work, we

apriori identified perpetuation of the family lineage via marriage as a fundamental everyday

interaction among many Chinese groups, which subsequently explained unique cultural variation

in stigma.

We proposed that threat of genetic contamination, in being central to everyday

interactions within Chinese groups but not European-American groups, would be distinct from

symbolic and tangible threats. The genetic contamination threat items did appear to be largely

distinct from other threat items, as the correlation between genetic contamination threat items

was highest, with lower correlations in relation to either tangible or symbolic threat.   Further,

this culture-specific threat appeared to capture unique elements of culture, as it explained

ethnicity's effect on stigma in Study 1 even after accounting for other threats. This evidence

indicates that concerns about genetic contamination constitute an independent, and empirically useful, construct in predicting stigma in Chinese groups.

Further Examination and Consideration of 'Threat to Lineage' among Chinese Groups

While we based our identification of 'threat to lineage' upon extensive prior anthropological fieldwork (AUTHORS, 2008), we did not directly test for lineage concerns as 'what matters most' among Chinese groups. This did not allow direct testing of whether lineage concerns differed among Chinese vs. European-Americans. Nor did we explicitly test whether a threat to lineage among Chinese groups caused greater mental illness stigma (although this is examined in a companion qualitative paper—see AUTHORS, in review). We instead infer the existence of this culture-based lineage threat among Chinese-Americans by using threat of genetic contamination as a proxy measure. Notably, the threat of genetic contamination measure explained ethnic differences in stigma in Studies 1 and 2 in a way consistent with that of a lineage-based threat. However, future studies might even more explicitly identify and test the effects of threat to lineage among these ethnic groups.

Given the convergence of evidence to suggest the existence of a threat to lineage among Chinese groups, we further propose that this culture-specific threat may impact stigma in other conditions among Chinese, including HIV/AIDS (Mak et al., 2007). We propose that stigma of HIV/AIDS might constitute a threat to lineage among Chinese groups, but via mechanisms other than genetic contamination. Here ethical judgments of behaviors perceived as linked with HIV, such as drug use, commercial sex, or homosexuality directly attacks the self-cultivation necessary for full-fledged 'personhood' in China (Hesketh et al., 2005). This contamination of character is potent enough to imperil the family's ability to negotiate crucial social opportunities such as marriage, thus threatening the lineage. Uninfected relatives thereby move to preserve the

lineage from such danger (AUTHORS, 2008). One vivid illustration among indigenous Chinese

groups occurs whereby the bodies of drug-abusing and commonly HIV-positive relatives were

placed in separate graveyards so that their evil spirits would not contaminate ancestors and

offspring (Deng et al., 2007). We thus propose that this core obligation to lineage is susceptible

to threat by a myriad of stigmatizing conditions.

Linkages to 'What Matters Most' Locally and Stigma

Culture-specific threats vary by cultural context and, we propose, are determined by the

fundamental everyday interactions of a social world. The cultural-specific threat of genetic

contamination among Chinese groups reflects a prior conceptualization that stigma coalesces

around those life engagements that 'matter most' within a local cultural context (AUTHORS,

2007). That is, while stigma affects many life domains, it is felt most acutely upon the everyday

interactions that define 'personhood' within cultural groups. This approach, which draws from

research on social dimensions of illness (Kleinman, 1988) emphasizes how stigma is embedded

in the "moral mode" of experience.

'Moral' in this sense, instead of demarcating right from wrong, refers to features of

everyday life characterized by the regular, daily engagements that define ''what matters most''

for individuals within a local world. To effectively engage in these everyday interactions is to be

certified as a full person. While we have identified the preservation of lineage as what defines

'personhood' within many Chinese groups, examples of what might be 'most at stake' in other

social worlds consist of the pursuit of distinct core lived values including status, money, life

chances, health, good fortune, a job, or relationships (Kleinman, 1988). Further, while

preservation of lineage appears to form a central aspect of 'what matters most' among Chinese

groups, other core cultural concepts, such as 'face' (AUTHORS, 2008) might be closely linked,

and incorporated, with lineage concerns. Both the stigmatizers and the stigmatized are engaged

in a similar process of holding onto and preserving what matters, and warding off threat to what

comprises 'personhood. Future work might examine the applicability of this conceptual

framework in elaborating the culture-specific constructs to predict stigma in this and other

cultural groups.

Future Directions

Our findings have implications for anti-stigma interventions by targeting culture-specific

perceptions of threat towards mental illness in Chinese groups (AUTHORS, 2007). Among

Chinese-Americans, the results suggest that in addition to conveying realistic assessments of

dangerousness and responsibility concerning the genesis of mental illness (AUTHOR, 2005),

emphasizing that environmental factors play an equal role to genetic factors in causing mental

illness and the relatively low absolute risk of heritability of most mental disorders (Kendler,

2001) may further reduce stigma. Such an anti-stigma approach differs markedly from current

anti-stigma interventions for mental illness, which emphasize biogenetic psychoeducation (Jorm

et al., 2005).

In sum, by identifying and testing a culture-specific threat that aids prediction of mental

illness stigma among Chinese-American groups, we advance an empirical framework of culture

and stigma. We intend this conceptualization to be further used to identify and test how stigma

works across other conditions and other cultural contexts.

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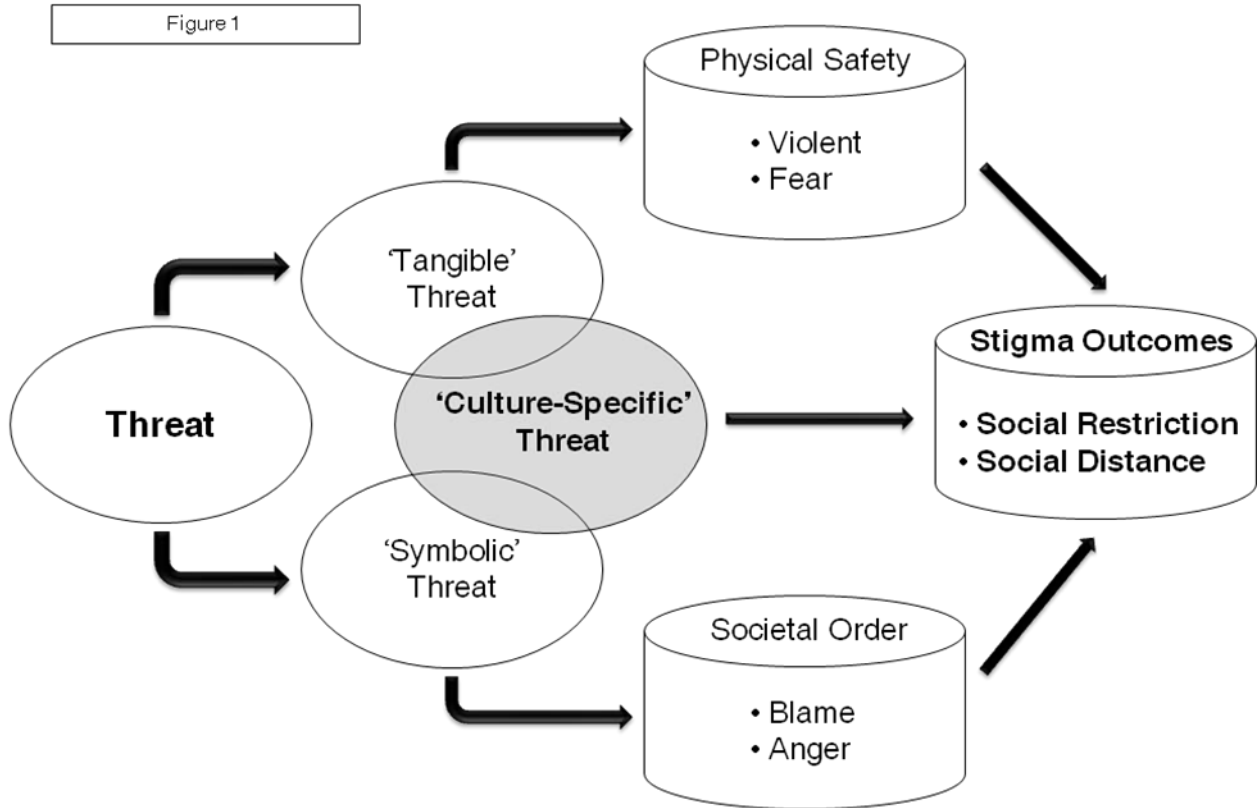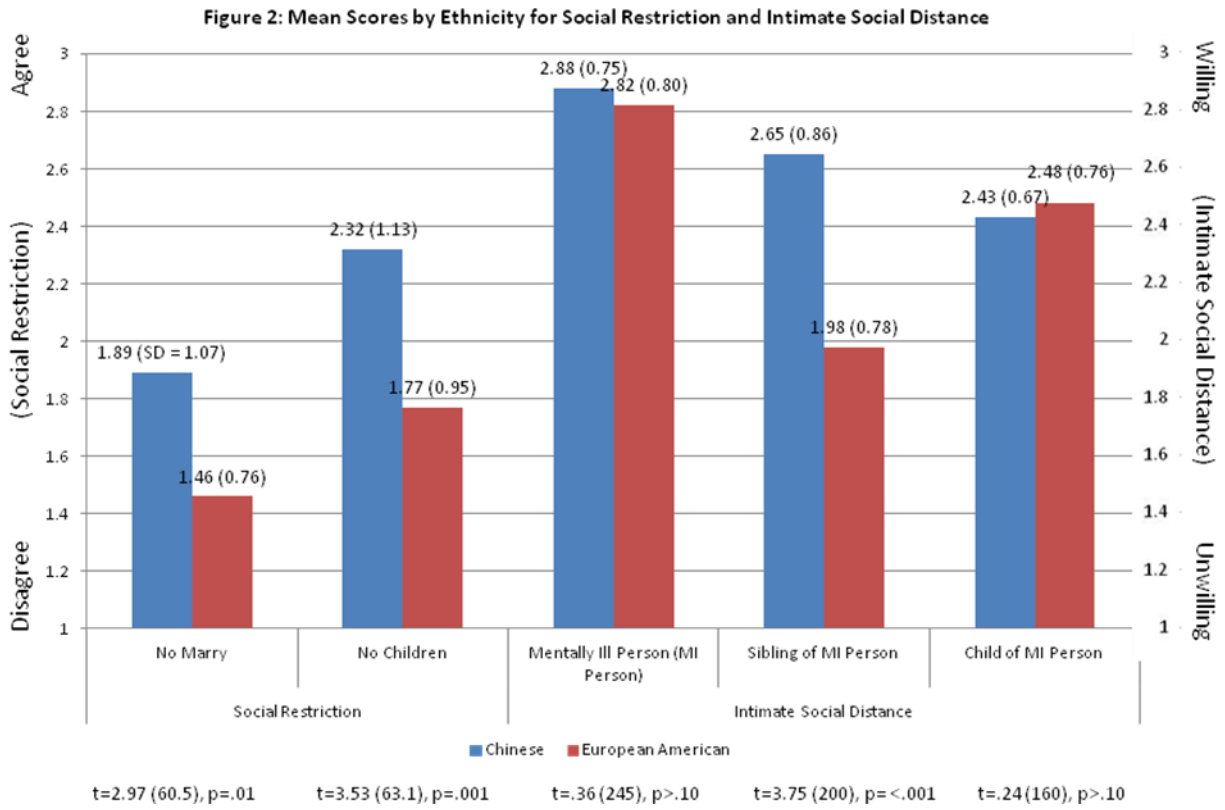
Figure 1. Diagram of the mechanisms by which threat influences stigma outcomes. 'Culture-specific' threat is shown to overlap partially with 'tangible' and 'symbolic' threats while also representing a distinct form of threat that leads to stigmatization.

Figure 2: Mean Scores by Ethnicity for Social Restriction and Intimate Social Distance

t=2.97 (60.5), p=.01   t=3.53 (63.1), p=.001   t=.36 (245), p>.10   t=3.75 (200), p= <.001   t=.24 (160), p>.10

Table 1

Sample Characteristics and Comparison with 2000 Census Data

		Chinese-American		European-American	
Sociodemographic Variable		Sample	Census	Sample	Census
Average Age (years)		41.8(16.3)	42.7	49.8(16.6)	46.6
Female (%)		60.0	52.4	64.3	51.7
College education or more among those >25yrs (%)[a]		66.7	51.6	58.7	40.7
Median family income (dollars)[b]		56,880	60,058	54,468	53,356
Foreign-Born (%)[c]		75.4	70.8	---	---
Religious Preference (%)	Christian	19.6	--	70.9	---
	Buddhist	26.8	--	.7	---
	Jewish	0	--	2.2	---
	No religious preference	50	--	16.1	---
	Other religion/ don't know	3.6	--	10.0	---

Note: Standard deviations are noted in (parentheses).
[a]Census reports educational attainment for individuals 25 years or older.
[b]Median family income is reported in 2001 dollars for the sample and 1999 dollars for the census.
[c]Census reports percentage foreign-born for all individuals, whereas the sample includes only individuals 18 years or older.

Table 2		A. No Marry (N = 628)						B. No Children (N = 617)						C. Intimate Social Distance from Sibling (N = 202)					
		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	Ethnicity (Chinese)	0.441***	0.536***	0.408***	0.498***	0.329***	0.246*	0.560***	0.659***	0.454***	0.603***	0.444***	0.300***	0.664***	0.720***	0.529**	0.574**	0.329[1]	0.226
		(0.110)	(0.106)	(0.109)	(0.107)	(0.103)	(0.105)	(0.130)	(0.125)	(0.126)	(0.126)	(0.125)	(0.125)	(0.179)	(0.177)	(0.177)	(0.182)	(0.176)	(0.174)
Sociodemographic	Education	---	-0.041*	-0.025	-0.039*	-0.029	-0.018	---	---	---	---	---	---	---	0.008*	0.003	0.006	0.006	0.002
			(0.19)	(0.19)	(0.19)	(0.18)	(0.18)								(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
	Age	---	0.013***	0.011***	0.013***	0.011***	0.010***	---	0.016***	0.013***	0.016***	0.014***	0.012***	---	0.122*	0.135**	0.097	0.074	0.084
			(0.002)	(0.002)	0.002	(0.002)	(0.002)		(0.002)	(0.002)	(0.002)	(0.002)	(0.002)		(0.053)	(0.051)	(0.053)	(0.050)	(0.048)
Attribution	Blame	---	---	---	0.160***	0.136**	0.136**	---	---	---	0.028	0.002	0.004	---	---	---	0.018	-0.004	0.021
					(0.049)	(0.046)	(0.046)				(0.058)	(0.057)	(0.055)				(0.087)	(0.081)	(0.078)
	Anger	---	---	---	0.095	-0.047	-0.062	---	---	---	0.226*	0.118	0.077	---	---	---	0.378**	0.186	0.191
					(0.077)	(0.074)	(0.074)				(0.091)	(0.091)	(0.089)				(0.132)	(0.128)	(0.123)
Social-Cognitive	Violent	---	---	---	---	0.106**	0.089*	---	---	---	---	0.155**	0.115*	---	---	---	---	0.192**	0.142*
						(0.040)	(0.040)					(0.049)	(0.049)					(0.072)	(0.069)
	Fear	---	---	---	---	0.307***	0.299***	---	---	---	---	0.232***	0.223***	---	---	---	---	0.276***	0.267***
						(0.042)	(0.042)					(0.053)	(0.052)					(0.073)	(0.070)
Threat to Genetic Contamination	Screening	---	---	0.106***	---	---	0.085**	---	---	0.188***	---	---	0.165**	---	---	0.113*	---	---	0.061
				(0.032)			(0.031)			(0.037)			(0.037)			(0.056)			(0.053)
	History MI	---	---	0.055	---	---	0.035	---	---	0.070	---	---	0.050	---	---	0.228***	---	---	0.223***
				(0.033)			(0.031)			(0.038)			(0.037)			(0.063)			(0.058)
	R-squared	4.8%	12.7%	15.4%	14.6%	24.1%	25.6%	11.6%	19.2%	24.2%	20.1%	25.1%	28.6%	6.6%	11.6%	22.3%	15.2%	27.2%	34.8%

* p < 0.05   ** p < 0.01   *** p < 0.001   [1] p < 0.06

Notes: Model 1= Ethnicity entered controlling for vignette set (#1 vs. #2) and vignette disorder (SCZ vs. MDD); Model 2= Adding significant sociodemographic covariates only to Model 1; Model 3= Adding threat of genetic contamination variables to Model 2; Model 4= Adding symbolic threat variables to Model 2; Model 5= Adding tangible threat variables to Model 4; Model 6= Adding threat of genetic contamination variables to Model 5. Unstandardized coefficients and standard errors are shown only for ethnicity, significant sociodemographic covariates, and potential mediators. Standard errors are in parentheses. Sample size for social distance is substantially smaller because respondents were randomly assigned to answer social distance questions about the vignette subjects or the sibling.

Table 3

Sample Characteristics for Study 2

Sociodemographic Variable	Chinese American Sample	European American Sample
Average Age (in years)	23.1(4.2)	23.3(2.9)
Female (%)	72.9	54.1
Highest level of education[a]	4.87	4.03
Median family income (in dollars)	$20,000-$30,000	$50,00-$60,000
Foreign-Born (%)	81.3	---
Political Views (1=very liberal: 7=very conservative)	1.81	3.28
Religious Preference (%) Christian	6.3	18.9
Buddhist	6.3	0
Jewish	0	10.8
No religious preference	83.3	54.1
Other religion/ don't know	4.2	13.5

Note: Standard deviations are noted in (parentheses).

[a]Highest level of education was scaled such that 4 = completing BA and 5 = completing MA, MBA, MD, law school degree

Table 4

Categories for coding responses in the free recall task, interrater reliability, and proportions of each category by ethnicity and explanation type

Categories	Examples	Agreement (κ)	European American		Chinese		F	p
			Genetic	Non-Genetic	Genetic	Non-Genetic		
Concern about passing on the illness to future generations	"The mental illness was heritable"	.743***	0.127	0.13	0.183	0.088	4.74	.032*
Concern about telling wife about the illness	"He lied to his wife"	-	0.146	0.099	0.07	0.088	2.65	0.107
Demographic background of the protagonist	"Jung (John) was 30 years old"	.966***	0.13	0.105	0.071	0.079	0.52	0.472
Experiences with the mental illness	"He thought people on TV were sending him messages"	.811***	0.356	0.368	0.329	0.398	0.63	0.43
Importance of marrying a healthy man	"It was important that she marry a healthy man"	-	0.036	0.017	0.031	0.045	0.15	0.233
Other	"She noticed his illness"	.655***	0.019	0.04	0.06	0.031	2.1	0.151
Relationship between the protagonist and his fiancé	"Jung (John) has a fiancé"	.919***	0.136	0.149	0.177	0.084	0.01	0.933
Scientific background of the illness	"The illness was neurobiological"	.812***	0.032	0.085	0.05	0.064	1.08	0.302
Uncodable	"Imagine a..." (incomplete sentence)	.804***	0.018	0.009	0.029	0.025	0.06	0.808

Note: The *F* and *p* values are measures of the interaction between ethnicity and explanation for illness. Dashes in the "agreement" column indicate that Kappa was unable to be computed because the table of values computed was asymmetric. Numbers below "European American" and "Chinese" are proportion of recalled statements by statement category.

*p<.05

Table 5

Recognition task: Means, standard deviations, and interactions of ethnicity and explanation type on number of correct responses, percentage-of-contamination-relevant errors (reversed), and sensitivity to contamination content

	European American				Chinese					
	Genetic		Non-Genetic		Genetic		Non-Genetic		*F*	*p*
	Means	Standard deviations	Means	Standard deviations	Means	Standard deviations	Means	Standard deviations		
Number of correct contamination-relevant responses	7.47	1.12	8.1	1.41	7.69	1.19	6.95	1.16	6.36	.014*
Percentage of contamination-relevant errors (reversed)	-0.498	0.22	-0.388	0.226	-0.424	0.142	-0.566	0.186	8.93	.004**
Sensitivity to contamination content	5.65	2.43	6.65	2.62	5.92	1.94	4.48	2.06	6.2	.015*

Note: The *F* and *p* values are measures of the interactions between ethnicity and explanation type: $df=80$ for all variables. Values under "European American" and "Chinese" are the means and standard deviations of the number of correct responses, percentage of contamination-relevant errors (reversed), and sensitivity to contamination content, by explanation type (genetic vs. non-genetic).
*$p<.05$ **$p<.01$

Electronic Supplementary Material (online publication only)