Cueing Morality:

The Effect of High-Pitched Music on Healthy Choice

XUN (IRENE) HUANG, APARNA A. LABROO

Web Appendix

WEB APPENDIX W1

IN-DEPTH INTERVIEWS WITH RESTAURANT MANAGERS: MAIN INSIGHTS

Table W1.1. General Belief about Background Music

	Genre(s) of Background Music Played	*Rationale for Choosing the Specific Music Genre(s)*	*Does Music Impact Sales, and Why?*	*Factors to Consider when Choosing Music*
Restaurant 1	Classical	Ancient Japanese music with no lyrics because it fits the theme of the restaurant very well (it's a sushi restaurant). The manager does not know the specific names of the songs.	Yes. The manager believes that the music affects their sales positively because it fits the overall theme of the restaurant, and slow music can make customers feel more relaxed.	It has to be slow, Japanese, quiet, and sentimental sometimes.
Restaurant 2	Jazz	Slow-paced piano music without strong rhythms. The manager is trying to create a relaxing dining environment.	Yes. The manager believes the music will affect the sales positively. Customers have complained before that their music was too loud. Slow-paced piano music is gentler and less obnoxious.	Not rhythmic; gentle, elegant.
Restaurant 3	Classical	The manager does not know the names of the songs. They chose it because it fits the restaurant theme.	No. The manager does not think it is necessary to play music at all.	It has to meet the owner's requirement—the songs that he likes to listen to.
Restaurant 4	Pop	Pop music is more fast-paced. And most fast food restaurants play light-hearted pop music.	Yes. The manager thinks pop music can make people eat faster unconsciously. They also play holiday music during holiday seasons. She thinks maybe this special atmosphere can help attract more customers.	The company's marketing positioning, current popular songs, songs that customers won't find too obnoxious.
Restaurant 5	Classical, country, heavy metal, jazz, pop, rock, and others	Playlist controlled by the corporate headquarters.	Yes. The manager believes the ambience and the appropriate amount of music encourages the customers to stay longer.	The manager cannot choose. Everything is controlled by the corporate headquarters.
Restaurant 6	Pop	This restaurant mainly plays pop music because the manager feels that it best connects with their	Yes. The manager feels their music appeals to customers and that it fits	Whether it's popular/relevant, and the catchiness, volume, genre

		image and appeals to their customers.	their image. Makes customers feel happy.	of music, and if the manager and staff enjoy it.
Restaurant 7	Pop, rock	Pop music can help create a friendly mood. Rock music can make customers eat faster.	Yes. The manager believes good music can help generate a good mood for customers and improve their dining experiences. Music genre really doesn't matter. She thinks it depends more on individual customer's preference.	Upbeat, motivating, popular, relaxing.
Restaurant 8	Classical, pop, rock	During non-dining hours, the restaurant plays slower and more atmospheric classical music because it's better for school work and can help customers become more productive. During lunch or dinner, the restaurant plays pop or rock, because these two types of music are more upbeat, can make the customers eat faster, and create a fast-paced environment.	Yes. The marketing department of Panera has determined what types of music to play. The manager believes the corporation has definitely done some marketing research.	Popularity, appropriateness, rhythm, flow, musician.
Restaurant 9	Jazz, pop	The corporation decides what to play. The manager thinks it's because jazz and pop music are more upbeat and customers will have a better mood when dining.	Yes. The manager believes jazz and pop music probably have a positive effect because they tried not playing any music one day and a few customers complained that the dining environment was too noisy.	Popularity, emotion, rhythm, feeling, relaxation.
Restaurant 10	Country	Country music is more light-hearted, and it creates a good atmosphere for dining.	Yes. The manager thinks people have a better mood and eat faster when listening to country music.	Flow, music type, upbeat, cheerful.

Table W1.2. Specific Beliefs about How the Music Pitch Might Affect Sales

	Is high- or low-pitched music more appropriate for facilitating the sales of healthy food (e.g., low-sugar, low-fat food)?	*Why?* *(Follow-up for the first question)*	*Anything Else the Managers Shared with Us Regarding the Role of Background Music*
Restaurant 1	High pitch	The manager believes that high-pitched music is better, but it's the stockholders' idea to play low-pitched music, so the manager really has no choice sometimes.	The manager believes that background music can provide a more comfortable dining environment. Other than that, it really doesn't have any tangible influence.
Restaurant 2	Low pitch	Low-pitched music can help shape a more relaxing and comfortable dining environment. Customers usually have a better experience and are more content with their service.	She thinks it's important because she likes to listen to music when eating.
Restaurant 3	High pitch	Did not provide a reason.	None.
Restaurant 4	Low pitch	Maybe people are more conscious of their weight, health, etc., when eating in a low-pitched environment.	They tried playing no background music before and they noticed that the overall atmosphere in the restaurant and people's dining experience decreased drastically. It basically felt like a high school cafeteria.
Restaurant 5	Low pitch	Low-pitched because it helps the ambience.	Doesn't have any effect on what music is played.
Restaurant 6	High pitch	Did not provide a reason.	None.
Restaurant 7	High pitch	When people listen to more upbeat music, they'll have the motivation to become healthy.	Background music is always helpful because it makes people feel less bored. Also, when people are eating without background music, there might be an awkward moment of silence.
Restaurant 8	High pitch	People are much more into health and fitness nowadays. Playing high-pitched music can make them be more self-aware.	Mostly beneficial. It can help customers relieve stress. But on the other hand, it can be distracting too.
Restaurant 9	Low pitch	People eat more slowly when listening to low-pitched music, and they are more conscious about what they are eating.	Background music is important and beneficial to the sales of our restaurant.
Restaurant 10	High pitch	When listening to high-pitched music, customers will feel more motivated and responsible to become healthy.	The owner doesn't know exactly why, but he thinks background music is important because every single restaurant he's been to plays background music.

WEB APPENDIX W2

A TEST OF STIMULI USED IN STUDIES 2 AND 3

To explore whether the healthy versus indulgent stimuli we used in Study 2 (selection of items with lower calories as the dependent variable), as well as the choices used in Study 3, are similar in perceived quality, we conducted a separate test with 51 participants (26 males; M_{age} = 38.37, SD = 11.36) recruited from Amazon's Mechanical Turk online platform.

Test Method and Results for Materials Used in Study 2:

For the testing of the dependent measures used in Study 2, participants indicated whether or not they think the eleven breakfast options provided by the same cafe are of similar quality. Seventy-seven percent of the participants indicated that the eleven breakfast options are of similar quality.

Test Method and Results for Materials Used in Study 3:

For the testing of the dependent measures used in Study 3, participants indicated whether the healthy and the indulgent option in each pair were similar in quality along a scale from (1 = the [healthy] option is of higher quality; 2 = the [indulgent] option is of higher quality; 3 = both are of similar quality). We replaced [healthy] and [indulgent] with the real labels of the options.

For item 1 (Apple Chips vs. Potato Chips), 33% of the participants indicated that both options are similar in quality, 59% of the participants indicated that the Apple Chips are higher in quality, and 8% of the participants indicated that the Potato Chips are higher in quality.

For item 2 (Vegetable Panini vs. Beef Cheeseburger), 31% of the participants indicated that both options are similar in quality, 45% of the participants indicated that the Vegetable Panini is higher in quality, and 24% of the participants indicated that the Beef Cheeseburger is higher in quality.

For item 4 (Gym Club Gift Card vs. Movie Theater Gift Card), 37% of the participants indicated that both options are similar in quality, 20% of the participants indicated that the Movie Theater Gift Card is higher in quality, and 43% of the participants indicated that the Gym Club Gift Card is higher in quality.

We did not include item 3 in this test because it measures people's tendency to engage in healthy versus unhealthy activities (i.e., watch TV vs. have physical exercises), and therefore no quality inferences can be made in this case.

WEB APPENDIX W3

SUPPLEMENTARY RESULTS OF STUDIES 2-5 WITH POST-CHOICE AROUSAL, POWER, AND MOOD AS COVARIATES

Study 2:

The main effect of pitch on dependent variable holds when we controlled for arousal, power, and mood ($F(2, 294) = 3.98$, $p = .020$), thus ruling out the unlikely possibility of post-choice arousal, power, or mood as somehow influencing our results.

Study 3:

A 2 (pitch) × 3 (genre) ANOVA with arousal, power, and mood as covariates revealed only our predicted main effect of pitch ($F(1, 592) = 16.37$, $p < .001$), thus ruling out the unlikely possibility of post-choice arousal, power, or mood as somehow influencing our results.

Study 4:

The main effect of pitch on dependent variable is marginally significant when we controlled for arousal, power, and mood ($F(1, 196) = 3.22$, $p = .074$), thus ruling out the unlikely possibility of post-choice arousal, power, or mood as somehow influencing our results.

Study 5:

Post-choice arousal, sense of power, and mood were used as covariates in the following analysis. A logistic regression predicting gift-card choice (1 = healthy, 0 = indulgent) from pitch (1 = high pitch, -1 = low pitch), salience (1 = morality, -1 = neutral thoughts), and their interaction revealed a significant interaction effect ($b = -.25$, $SE = .10$, $z = -2.39$, $p = .017$), thus ruling out the unlikely possibility of post-choice arousal, power, or mood as somehow influencing our results.

WEB APPENDIX W4

SUPPLEMENTARY RESULTS OF STUDIES 2-5 WITH DATA EXCLUSIONS

In this analysis, we exclude data of participants who (a) reported already participating in a similar study, (b) reported not hearing the music at the end of the study, or (c) reported not wearing headphones at the end of the study. Note here that it is unclear what participants were referring to when they reported having already participated in a similar study because the exact study had not previously been run before. Amazon Prime also excludes participants who have completed a similar study before. Moreover, in all the studies, participants were asked to only take the study if their devise was audio equipped and they had headphones. At the start of a study, we also explicitly asked participants to wear their headphone and they had to confirm they could hear the music before proceeding to the questions. Thus it is unclear why some participants would say at the end of the study that they did not wear headphones or could not hear the music. The most likely interpretation of this response is that by end of the study the music had stopped playing and therefore participants had removed their headphones. They therefore may have been responding that at that moment they could not hear music/ did not have headphones on. It is also possible some of these participants could have heard music without headphones. Due to pure speculation on these matters, we believe using these exclusion criteria are not appropriate. Thus, these analyses are provided only as supplementary analyses for curious readers and for full disclosure. Note that if participants truly did not hear any music they should be distributed similarly across the music conditions and their presence should hurt our results.

Study 2:

Thirty-six participants reported at the end of the study that they did not wear a headset or listen to music. Ten additional participants reported having participated in a similar study. If we excluded their data from further analysis, then N = 254. Music comfort and pleasantness were used as covariates in the following analysis. Since there is a missing data point on the measure of pleasantness, the number of participants of the following analysis is 253. A one-way ANCOVA on healthy items ordered yielded the expected main effect of pitch ($M_{high\text{-}pitch}$ = .81, SD = .65 vs. $M_{normal\text{-}pitch}$ = .56, SD = .71 vs. $M_{low\text{-}pitch}$ = .51, SD = .58; $F(2, 248) = 4.21$, $p = .016$).

Study 3:

Eighty-six participants did not wear a headset or listen to music. Seventeen additional participants reported having participated in a similar study. If we excluded their data from further analysis, then N = 498. Music comfort and pleasantness were used as covariates in the following analysis. A 2 (pitch) × 3 (music genre) ANCOVA predicting the healthy-choice index revealed only a main effect of pitch ($M_{high\text{-}pitch}$ = 1.63, SD = 1.24 vs. $M_{low\text{-}pitch}$ = 1.28, SD = 1.07; $F(1, 490) = 10.76$, $p = .001$). No other effects were significant (ps > .56).

Study 4:

Twenty-nine participants did not wear a headset or listen to music. Eleven additional participants reported having participated in a similar study. If we excluded their data from further

analysis, then N = 161. Music comfort and pleasantness were used as covariates in the following analysis. A one-way ANCOVA on likelihood to engage in healthy activities yielded the expected marginally significant main effect of pitch ($M_{high\text{-}pitch}$ = 3.84, SD = 1.88 vs. $M_{low\text{-}pitch}$ = 3.45, SD = 1.67; $F(1, 157) = 3.72$, $p = .056$).

Study 5:

Sixty-one participants did not wear a headset or listen to music. Nine additional participants reported having participated in a similar study. If we excluded their data from further analysis, then N = 331. Music comfort and pleasantness were used as covariates in the following analysis. A logistic regression predicting gift-card choice (1 = healthy, 0 = indulgent) from pitch (1 = high pitch, -1 = low pitch), salience (1 = morality, -1 = neutral thoughts), and their interaction revealed a non-significant interaction effect (b = -.16, SE = .11, z = -1.38, $p = .169$).

WEB APPENDIX W5

SUPPLEMENTARY RESULTS OF STUDIES 2-5 WITH NO COVARIATES

In this section, we report the results of studies 2-5 without any covariates.

Study 2:

A one-way analysis of variance (ANOVA) on healthy items ordered yielded the expected main effect of pitch ($F(2, 297) = 4.69$, $p = .010$). Participants listening to high-pitched music ordered more healthy items ($M = .78$, $SD = .62$) than those listening to normal-pitched music ($M = .55$, $SD = .69$; $F(1, 297) = 6.81$, $p = .010$) or low-pitched music ($M = .52$, $SD = .59$; $F(1, 297) = 7.43$, $p = .007$; no significant difference between the latter two conditions, $p > .74$).

Study 3:

A 2 (pitch) × 3 (music genre) ANOVA predicting the healthy-choice index revealed only a main effect of pitch ($M_{high\text{-}pitch} = 1.66$, $SD = 1.22$; $M_{low\text{-}pitch} = 1.24$, $SD = 1.07$; $F(1, 595) = 18.48$, $p < .001$). No other effects were significant (ps > .49), implying that the effects of pitch on healthy choice are observed across music genres.

Study 4:

A one-way ANOVA revealed a main effect of pitch on desire to engage in healthy activities ($F(1, 199) = 3.77$, $p = .054$). Participants listening to high-pitched music were more likely to engage in healthy activities ($M = 3.88$, $SD = 1.90$) than were those listening to low-pitched music ($M = 3.39$, $SD = 1.64$).

Study 5:

A logistic regression predicting gift-card choice (1 = healthy, 0 = indulgent) from pitch (1 = high pitch, –1 = low pitch), salience (1 = morality, –1 = neutral thoughts), and their interaction revealed only a significant interaction effect ($b = –.24$, $SE = .10$, $z = –2.37$, $p = .018$). The main effects of pitch and morality salience did not reach significance (ps > .13). Crucial to our theorizing that low-pitched music does not spontaneously make morality thoughts accessible and therefore morality (vs. neutral) priming will increase morality thoughts among people listening to low-pitch music, we found among them that morality priming increased healthy choice ($M_{morality} = 53.33\%$ vs. $M_{neutral} = 34.04\%$, $b = .40$, $SE = .15$, $z = 2.72$, $p = .007$). Their choices became similar to those made by participants in the high-pitched music condition ($M = 42.59\%$) who did not receive this additional morality cue.

WEB APPENDIX W6

ADDITIONAL (CALIBRATION) STUDIES

In this section, we report two additional studies (Studies A1 and A2) which failed to provide significant results, and a third study (A3) that replicated study A2 but with different procedures and did find some effects. The first two studies are calibration studies. We still report the procedure and results of these two studies as they can provide useful information for future researchers who wish to replicate our research. They speak to the importance of considering carefully the construct of interest and allowing manipulations to adequately operationalize the construct of interest, without at the same time making the manipulation potentially too obvious and causing a reactance among participants.

Study A1

Study A1 was a calibration study and was run prior to studies 2-5. It comprised two major departures in procedures compared to Studies 2-5. First, the cover story was impoverished in this study compared to the one we used in studies 2-5. In studies 2-5 participants were instructed that experimenters were interested in the kinds of choices consumers make when they are listening to music. Thus, they should put on the audio and their headphones and listen to the music as they might normally listen to music while they are shopping. They should let any thoughts flow as they might if they were shopping while listening to the music. Participants saw these instructions on a separate page, and then when they clicked on the next screen for music they were again reminded to ensure the music was playing and they were listening to it as they normally might on a shopping trip. Second, equally importantly to allow the music to play for at least some time, so participants could familiarize themselves with it, we asked participants to evaluate various characteristics of the music. This procedure allowed participants to spend some time listening to the music.

These two crucial procedures were missing in Study A1 where participants after consent were asked to put on their headphones and music and to then go ahead and immediately make choices. Participants did evaluate characteristics of the music also in Study A1, but after they had made choices. We believe this study demonstrates the (unsurprising) importance of allowing music to play at least for a few seconds and for participants to not be suspicious but comfortable with it in order to observe any effects of music on choice.

Method

Participants and design. Two hundred thirty-nine workers (137 males; M_{age} = 39.38) from MTurk participated for payment (US$0.50) in a single-factor, three-level (pitch: high vs. normal vs. low) between-subjects study. As a study prerequisite, participants were required to have an audio-capable device and available headphones for the study.

Procedure. We first instructed participants to put on their headphones and to confirm that they could hear the music file playing. We used the same music as in Study 2, with the pitch adjusted up or down by 50%. Participants were randomly allocated to listen to a high or low or an unaltered (normal) pitch version of the same rock music. Participants then were presented a menu listing different food options and associated calories of each option (as in Study 2) and

asked to order off the menu as if in a cafe. Participants indicated all item(s) they would order. Among all the 11 items in the menu, five of them (items #2, #3, #5, #8, #11) are low calorie and can be considered as relatively healthy items. As our key dependent variable, we summed up the total number of healthy items participants ordered (range: 0-5).

Participants then completed manipulation checks rating characteristics of the music they listened to (1 = low-pitched, unfamiliar, discomforting, slow tempo, unpleasant to 9 = high-pitched, familiar, comforting, fast tempo, pleasant), arousal (1 = relaxed, sluggish, depressed, drowsy, calm; 9 = stimulated, frenzied, upbeat, energetic, aroused; averaged into an arousal index, $\alpha = .77$), feelings of power (1 = powerless, 9 = powerful), and their mood (1 = sad; 9 = happy). Then participants reported age, gender, where they took the study (e.g., home, office), and device (e.g., desktop, laptop); 93.7% completed the study at home, and 42.3% used a desktop and 53.1% a laptop computer. Finally, they indicated whether they followed our instructions to (a) wear a headset and (b) listen to the music.

Results and Discussion

Manipulation checks and controls. As expected, participants indicated that the high-pitched music was of a higher pitch than the normal or low-pitched music (see Table W6.1. for means and SDs). Low-pitch music was rated as less familiar and slower in tempo than high and normal pitch music. Moreover, music across the three pitch conditions also differ in terms of comfort and pleasantness (see Table W6.1.). Important to note here is these measures were taken post choice and thus if the music led to different choices in the experimental conditions these measures could reflect feelings that are a combination of the music and the choices participants just made.

Total healthy items ordered. We could not use music comfort and pleasantness as covariates in the analysis for this study because these items were measured after choice and not before it as in Studies 2-5. As these items were measured after choice, the evaluations participants provided could have been impacted by the choices they made. A one-way ANOVA on healthy items ordered revealed a non-significant main effect of pitch, but the results pattern is consistent with the prediction ($M_{high} = .75$, SD = .77; $M_{normal} = .63$, SD = .66; $M_{low} = .58$, SD = .57; $F(2, 236) = 1.37$, $p = .257$). If we combine both normal pitch and low pitch conditions together, which is in line with our theorizing that normal and low pitch effects will be similar, and compare high pitch condition and normal/ low pitch condition, the effect becomes directional ($M_{high} = .75$, SD = .77; $M_{normal/low} = .61$, SD = .62; $F(1, 237) = 2.52$, $p = .114$).

Total number of food items ordered. We also ran a one-way analysis of variance (ANOVA) on overall number of choices participants made. We found participants not differ across conditions on number of food items chosen ($F(2, 236) = .047$, $p = .955$; $M_{high\text{-}pitch} = 1.43$, SD = 1.00; $M_{normal\text{-}pitch} = 1.43$, SD = .83; $M_{low\text{-}pitch} = 1.47$, SD = .81).

Discussion. Although the results pattern is consistent with our prediction, the main effect did not reach significance. We suspect this result arose because in this study we asked the dependent variable immediately after the music started playing and this is likely to have reduced the impact of the manipulation because participants had not listened to much music. The cover story was also impoverished and participants may have been distracted or suspicious while trying to figure out what the task entailed. Third, in this study we could not control for any potential mood effects the music may have created. The reason is that music evaluations were taken after the choice task, and thus evaluation of the music could have been influenced by the choices

participants initially made. In Studies 2-5 we therefore made a deliberate choice to place the music evaluation items immediately as soon as the music played because this procedure is more in line with the cover story, allows participants to become comfortable with the music, and for us to control for any possible mood effects that might arise from pleasantness of comfort of the music. Future studies which aim to investigate the effect of music pitch might wish to (a) ensure a cover story is used that increases participants comfort with the task and music and they approach the music in a natural manner, (b) there is sufficient time between when the music is started and when participants provide the dependent variable because it is important to ensure participants had listened to some music before asking the dependent variable questions, and (c) if mood or other factors that the music might evoke could either attenuate or exaggerate the effects of mood on the dependent variable, then these items are measured before the dependent variable is sought.

Study A2

This study was run after Study A1. Concerned that the results of study A1 may have been stronger if we had more overtly told participants when choices are healthy, in this study, to strengthen the dependent variable and overtly make clear to participants which choice is healthy and which is not healthy, we added an icon of a green leaf next to each healthy choice. It seems as a result, to our surprise, the effects we observed in Study A1 and Study 1, and later in Studies 2-5, somewhat reversed. We believe that adding the leaf could have led to reactance, made participants infer the healthy foods are not filling, or are not healthy, or something else. This (non-significant) reversal is interesting and future researchers may wish to investigate what factors could result in a backfire of our hypothesized effect. We thus report these data to stimulate future academic inquiry into this possibility.

Note additionally that similar to Study A1, this study employed the same impoverished cover story and also measured music characteristics after participants had already made their choices. This study design thus, similar to Study A1 did not allow participants time to familiarize with the music and moved them immediately from starting the music to making choices. Again, similar to Study A1, this lack of any immersion in the music could have accounted for the weak results of this study. Moreover, as in Study A1, because we measured music characteristics after choice, and thus choice could have impacted evaluations differently in differ music conditions, we could not use these items as controls for mood in our analysis. This difference as well may well have accounted for the weaker results.

Method

Participants and design: Six hundred and one workers (309 males; M_{age} = 42.12) from MTurk participated for payment (US$0.50). The study followed a 2 (pitch: high vs. low) × measured belief "healthy choice is moral" design, with pitch manipulated and belief measured as a continuous variable. Participants had to confirm that they had an audio-capable device and available headphones as a participation prerequisite.

Procedure. Participants were first instructed to put on their headphones and confirm that they could hear the music file playing. We used the same music as in Study 1, with the pitch adjusted up or down by 50%. Participants were asked to imagine they were ordering breakfast at a local cafe. The menu included calorie information. Participants were asked to choose one item

they would order. The menu is identical to the one used in Study 2 and A1, with a key difference that in this menu, each of the five healthy options were additionally highlighted by a green leaf. Also in this study, participants were not allowed to choose multiple items. We recorded whether one of the five healthier items (an item with green leaf) was ordered (1 = healthy item was chosen, 0 = healthy item was not chosen).

Participants then answered five questions reflecting the extent of their belief that healthy choice is moral (To what extent do you believe that choosing healthy food… Q1: is moral, Q2: is virtuous, Q3: adheres to high moral standards, Q4: reflects your moral identity? Moral identity is the degree that moral concerns are a central part of your identity, i.e., your sense of who you are, and Q5: habits are associated with moral identity? $\alpha = .95$, all averaged into a belief index).

Note parenthetically, that after running this study we realized that only Q1 and Q2 reflects beliefs that choosing healthy food is a moral and virtuous choice. For Q3, participants may be unclear what moral standard is. Also, rather than provide beliefs about the relationship between healthy choice and moral the question asks participants to consider their own standards of morality. Q4 and Q5 similarly refer to a participants own choice being moral. These latter three items are not conceptually reflective of beliefs that healthy choices are also more moral. Thus in Study A3, we employed only a two item scale with Q1 and Q2 as these items reflect more clearly our construct of interest that a participants belief that healthy choices are moral choices.

In this study, participants then rated characteristics of the music, their arousal ($\alpha = .76$), power and mood, and reported age, gender, location (79.5% at home), device (46.1% desktop, 49.4% laptop), and whether they followed the instructions to wear a headset/ listen to music during the study.

Results and Discussion

Manipulation checks and controls. As expected, participants indicated that the high-pitched music was of a higher pitch than the normal or low-pitched music (see Table W6.1. for means and SDs). High-pitched music was rated as more familiar and faster in tempo than the low-pitched music, while low-pitch music was rated as more comforting and pleasant than high-pitched music. Important to note here is these measures were taken post choice and thus if the music led to different choices in the experimental conditions these measures could reflect feelings that are a combination of the music and the choices participants just made.

Healthy item ordered. We could not control for music comfort and pleasantness in this analysis because the measures were taken post choice. A logistic regression predicting healthy-item ordered (1 = a heathy item was ordered, 0 = a healthy item was not ordered) from pitch (1 = high pitch, -1 = low pitch), belief (mean-centered), and their interaction yielded significant effects of pitch ($M_{high} = 52\%$, $M_{low} = 59\%$, b = -.19, SE = .09, z = 2.16, $p = .031$) and belief (b = .23, SE = .04, z = 5.96, $p < .001$). The interaction effect is not significant ($p > .68$).

Discussion. In this study, surprisingly we observed a reversed pattern of our main findings. This reversal may have arisen because of the overt labeling of foods as healthy which potentially could have resulted in reactance. Future research should replicate and explore reasons for this reversal. We speculate the reversed effect occurred because we made the concept of healthiness too salient by adding a green leaf to highlight them, it might induce psychological reactance among participants and therefore leads them to choose less healthy choices. Furthermore, again, in this study, participants immediately answered the dependent variable

questions after playing the music, and thus participants may not have enough exposure to the music. This may have weakened the results we observed, similar to the weakened results of Study A1.

Study A3

This study was run to replicate Study A2 with adjusted procedures. The goal was to show high-pitched music increases healthy preferences by heightening moral self-perception because consumers perceive healthy choices as more moral and consistent with their moral self-perception. For participants who believe healthy choice is moral, listening to high-pitched music should increase healthy choice; for those who do not believe healthy choice is moral, this effect should attenuate.

Method

Participants and design. Four hundred seventy-five MTurk workers (219 men; M_{age} = 39.11 years, SD = 12.51; one age unreported) participated for payment (US$.30). The study was a 2 (pitch: high vs. low) × measured belief "healthy choice is moral" design, with pitch manipulated and belief measured as a continuous variable. As a study prerequisite, participants needed to confirm that they had an audio-capable device and available headphones.

Procedure. We first instructed participants to put on their headphones and to confirm that they could hear the music file playing. We used the same music as in Study 4, with the pitch adjusted up or down by 50%. Participants then rated music characteristics as in previous studies. We asked participants to then make two food consumption choices, each between a healthy and unhealthy option. For option 1 (Light, Baked Apple Chips vs. Cheesy Cheddar Potato Chips), in a pretest, 31% of the participants indicated that both options are similar in quality, 57% of the participants indicated that the Apple Chips are higher in quality, and 12% of the participants indicated that the Potato Chips are higher in quality. For item 2 (Grilled Chicken Panini vs. Beefy Loaded Cheeseburger), 29% of the participants in a pretest indicated that both options are similar in quality, 51% of the participants indicated that the Grilled Chicken Panini is higher in quality, and 20% of the participants indicated that the Beefy Loaded Cheeseburger is higher in quality.

We coded healthy choice as 1 and unhealthy choice as 0, summing scores across both choices for each participant to create a healthy-choice index (range: 0 to 2). Participants then rated post-choice their arousal (α = .68), sense of power, and mood (as in Studies 2-5) and reported their age and gender, location (87.4% at home), device (40.2% desktop, 54.3% laptop). Next, participants answered two questions reflecting the extent to which they believed that healthy choice is moral ("To what extent do you believe that choosing healthy food … Q1: is moral, and Q2: is virtuous" r = .77, averaged into a belief index). Some readers may suggest these questions could lead to demand effects, but note that we predict an interaction effect between pitch and belief. A demand effect can only explain a main effect of belief but not the interaction of belief with pitch. Finally, participants indicated whether they wore a headset and listened to music while completing the task.

Results

Manipulation checks and controls. Participants rated high- (vs. low-) pitched music as higher in pitch (see Table W6.1.) but not in familiarity, and tempo (*p*s > .17). High- (vs. low-) pitched music was considered less comfortable and less pleasant (see Table W6.1.).

Total healthy choices ordered. A regression analysis predicting healthy-choice from pitch (1 = high pitch; –1 = low pitch), belief (mean-centered), and their interaction, using music pleasantness and comfort as covariates, yielded a main effect of belief (b = .05, SE = .02, t(469) = 2.87, $p = .004$), and a marginal effect of pitch (b = .06, SE = .04, t(469) = 1.83, $p = .068$; covariates *p*s > .42). Central to our theory, the pitch × belief interaction was also marginally significant (b = .03, SE = .02, t(469) = 1.73, $p = .085$). To explore this interaction, we conducted a Process Model 1 (Hayes 2013) at ±1 standard deviation from the mean of the "healthy choice is moral" belief. As we predicted, among participants with high beliefs that a healthy choice is moral, high- (vs. low-) pitched music increased healthy choice (b = .12, SE = .05, t(469) = 2.55, $p = .011$); conversely, at low levels of belief, this difference was attenuated (b = .00, SE = .05, ns).

Table W6.1. Summary of Manipulation Checks and Controls – Studies A1, A2, and A3

	Pitch	Familiarity	Comfort	Tempo	Pleasantness	Arousal	Power	Mood
Study A1 (Rock Music)								
High Pitch	5.52(1.62)[a]	3.64(2.12)[a]	5.74(1.95)[b]	5.70(1.39)[a]	5.79(1.83)[b]	5.39(1.33)[a]	5.84(1.70)[a]	6.49(1.59)[a]
Normal Pitch	4.84(1.48)[b]	3.81(2.16)[a]	6.42(2.09)[a]	5.49(1.35)[a]	6.49(1.84)[a]	5.13(1.27)[a]	5.76(1.57)[a]	6.42(1.70)[a]
Low Pitch	3.80(1.95)[c]	2.82(2.06)[b]	5.00(2.34)[c]	4.97(1.77)[b]	4.86(2.43)[c]	5.00(1.51)[a]	5.63(1.78)[a]	5.99(2.13)[a]
F-stat: $F(2, 236)$ =	20.88, $p < .001$	4.95, $p = .008$	8.74, $p < .001$	4.90, $p = .008$	12.60, $p < .001$	1.75, $p = .175$	.31, $p = .737$	1.79, $p = .169$
Study A2 (Classical Music)								
High Pitch	6.92(1.43)[a]	4.05(2.42)[a]	6.04(2.20)[b]	3.71(1.57)[a]	6.20(2.16)[b]	4.86(1.41)[a]	5.58(1.73)[a]	6.42(1.85)[a]
Low Pitch	4.42(1.80)[b]	3.53(2.33)[b]	6.85(1.92)[a]	3.31(1.80)[b]	6.77(1.94)[a]	4.65(1.38)[a]	5.70(1.56)[a]	6.54(1.63)[a]
F-stat: $F(1, 599)$ =	358.48, $p < .001$	7.22, $p = .007$	23.10, $p < .001$	8.48, $p = .004$	11.44, $p = .001$	3.30, $p = .070$	.91, $p = .342$	.72, $p = .396$
Study A3 (Classical Music)								
High pitch	6.32 (1.66)[a]	5.34 (2.53)[a]	6.47 (2.13)[b]	3.29 (1.46)[a]	6.47 (2.19)[b]	4.54 (1.27)[a]	5.48 (1.65)[a]	6.31 (1.89)[a]
Low pitch	4.75 (1.53)[b]	5.02 (2.48)[a]	7.35 (1.60)[a]	3.10 (1.60)[a]	7.32 (1.71)[a]	4.38 (1.26)[a]	5.61 (1.65)[a]	6.52 (1.89)[a]
F-stat: $F(1, 473)$ =	114.02, $p < .001$	1.86, $p = .173$	25.61, $p < .001$	1.85, $p = .175$	21.84, $p < .001$	1.99, $p = .159$	.67, $p = .415$	1.46, $p = .227$

Note: Cells with different superscripts in each column (within each study) differ at $p < .05$.

WEB APPENDIX W7

SINGLE-PAPER META-ANALYSIS ON HEALTHY CHOICE

To test the robustness of our findings and support our theoretical framework, we conducted a meta-analysis of the main effect of pitch on healthy choice across Studies, using a statistical tool developed by McShane and Böckenholt (2016) for single-paper meta-analyses. Because we used different measures to capture healthy choice (Studies 1 and 5) versus scales (Studies 2, 3, and 4), we conducted the meta-analysis for each type of dependent measure separately.

Consistent with our hypothesis, the meta-analysis revealed that there is a significant difference in high-pitch and low-pitch conditions and the effect persists across different measurement scales:

- Choice between healthy versus unhealthy item (Estimate = .2357, *SE* = .1236; $z = 1.91$, $p = .057$; Studies 1 and 5; for Study 5, we included only the neutral priming data; see Figure W7.1.);
- Likert scale (Estimate = .3494, SE = .0716; z = 4.88, $p < .001$; Studies 2, 3, and 4; for Study 2, we included only high- (vs. low-) pitch conditions; for Study 3, we used the main effect of high pitch (vs. low pitch) on healthy choice in the meta-analysis; see Figure W7.2.).

Figure W7.1.

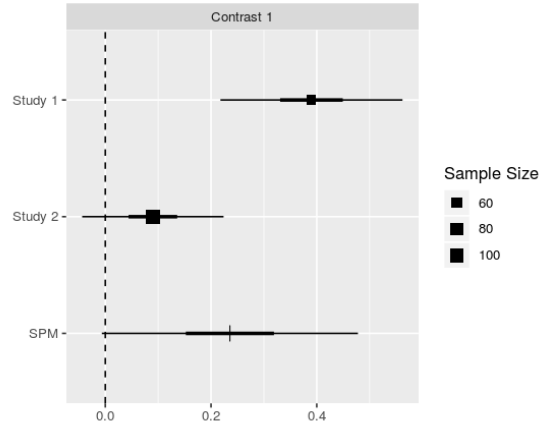
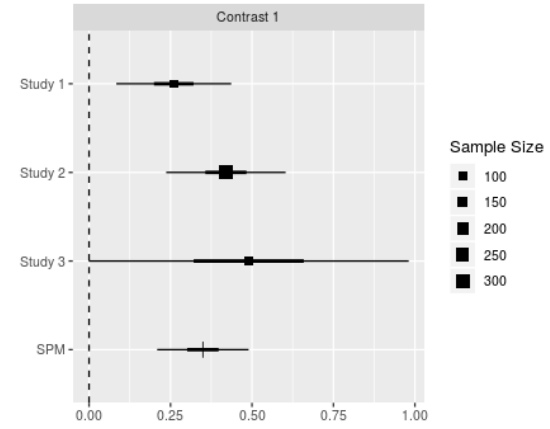


Figure W7.2.



Note: "Study 1" and "Study 2" included in the meta-analysis shown in Figure W7.1 refer to Studies 1 and 5 in the article. "Study 1", "Study 2", and "Study 3" included the meta-analysis shown in Figure W7.2 refer to Studies 2, 3, and 4 in the article.