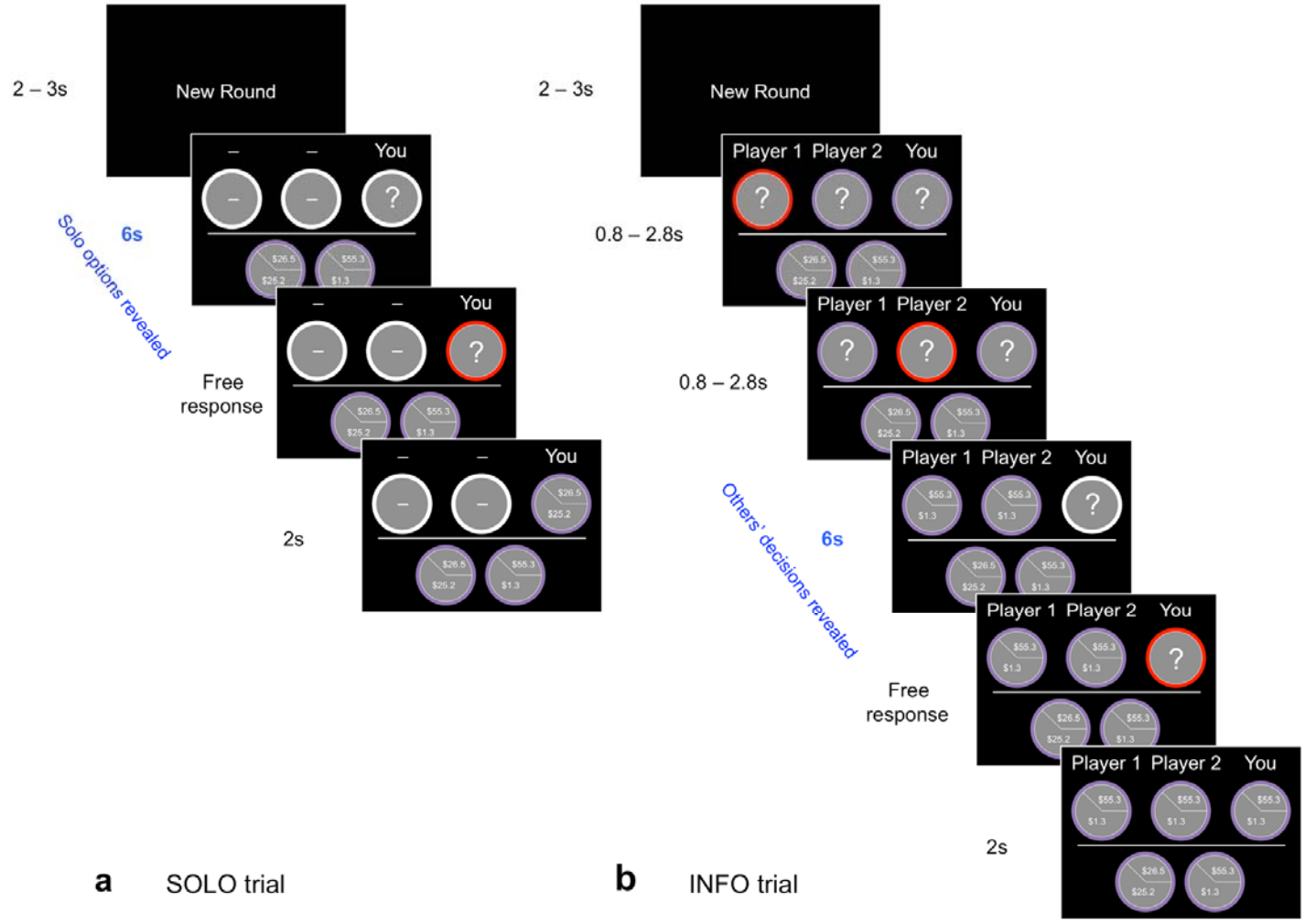


Supplementary Figure 1

Task timeline for Solo and Info trials.

Each trial started with a 'New Round' screen. Participants made a series of choices between two gambles, one of which was objectively riskier than the other. The decisions were made **(a)** alone ('Solo' trials) and also **(b)** with information provided about other players' selections ('Info' trials). At the start of each trial, a new pair of gambles was presented. For each pair, the safer ('safe') gamble had lower payoff variance, and the riskier ('risky') gamble had greater payoff variance (see **Online Methods** for full gamble details). On Info trials, two others' decisions were displayed prior to the participant's cue to enter a choice. Info and Solo trials were intermixed with a new random order for each participant and drawn without replacement from a uniform distribution.

a

	Safer gamble		Riskier gamble	
Menus	A1 ($)	A2 ($)	B1 ($)	B2 ($)
M1	33.2	23.1	56.8	1.7
M2	20.8	15.2	37.4	1.1
M3	19.6	18.0	38.6	0.9
M4	25.5	24.9	50.8	1.3
M5	24.4	23.0	51.1	1.2
M6	26.7	21.4	51.6	1.4
M7	26.5	25.2	55.3	1.3
M8	28.3	26.6	55.5	1.6

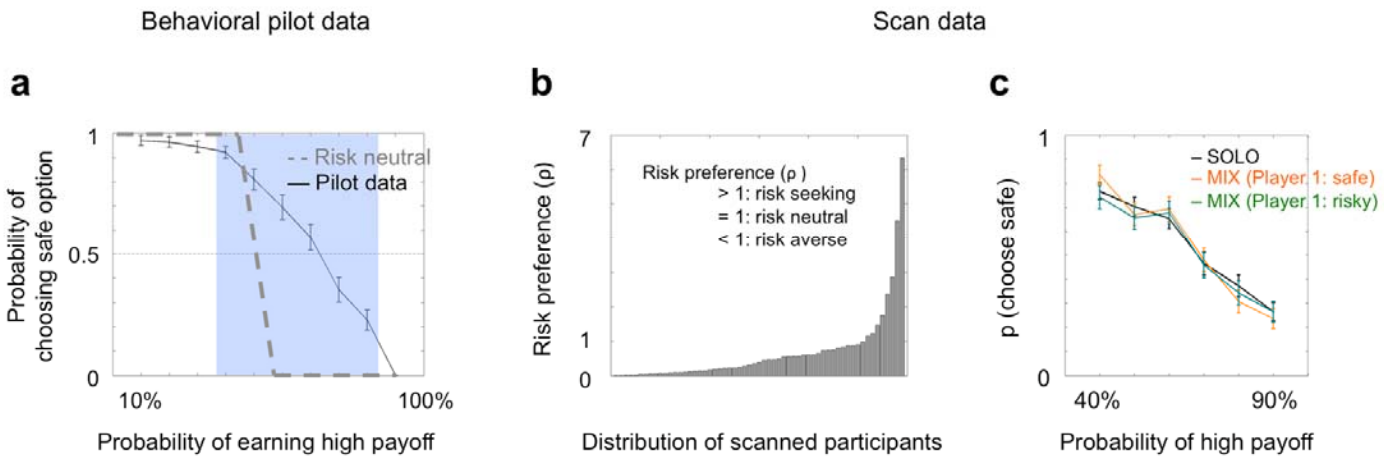
b

Probability of earning high payoff (%)	Safer gamble	Riskier gamble
40	4/10 of A1, 6/10 of A2	4/10 of B1, 6/10 of B2
50	5/10 of A1, 5/10 of A2	5/10 of B1, 5/10 of B2
60	6/10 of A1, 4/10 of A2	6/10 of B1, 4/10 of B2
70	7/10 of A1, 3/10 of A2	7/10 of B1, 3/10 of B2
80	8/10 of A1, 2/10 of A2	8/10 of B1, 2/10 of B2
90	9/10 of A1, 1/10 of A2	9/10 of B1, 1/10 of B2

Supplementary Figure 2

Payoffs and probabilities of paired gambles.

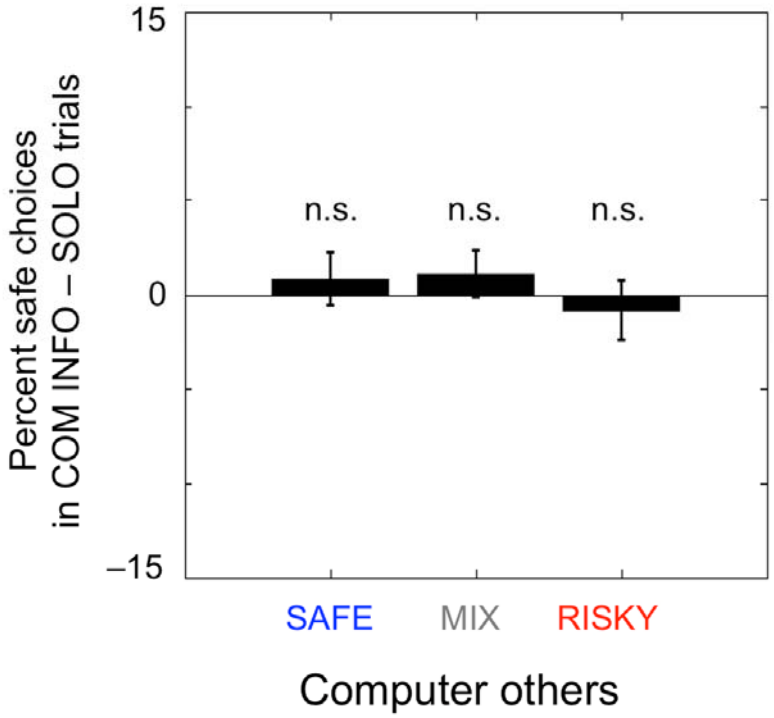
Eight unique paired lottery menus were used (adapted from Holt & Laury[10]). For each menu, high and low payoffs for the safe and risky gambles were held constant, but the probabilities varied. **(a)** The high and low payoffs for each menu of gambles are shown here. To avoid potential biases for or against any particular menu, for each participant, gambles from four of the eight lottery menus were randomly selected to be presented, and trial order was randomized for menu x probability x trial type with a unique order per participant. **(b)** For scanning, we used the 6 pairs symmetric around the mean indifference point (for each menu, gambles 40%, 50%, 60%, 70%, 80% and 90% probability of high payoff).



Supplementary Figure 3

Behavioral data from pilot and scanned participants indicating risk-aversion in a majority of participants.

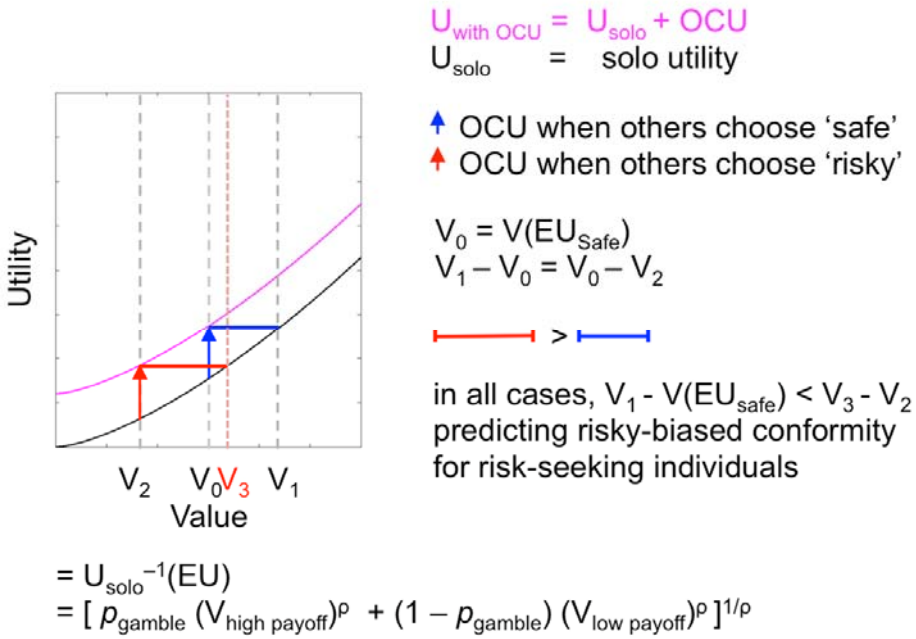
(a) The gambles were piloted in N = 54 behavioral participants. These pilot data verified that the chosen payoff amounts and format were appropriate for revealing individual differences in risk preferences. As in Holt & Laury[10], participants were risk averse, with the mean indifference ('switch over') point between the high payoff probabilities of 60 and 70%, to the right of risk neutral (dotted line, between 40 and 50%). **(b)** Individual risk preferences were estimated from Solo trial choices from the main study and indicated risk aversion ($\rho < 1$) for a majority of participants. **(c)** Mix Info trials are those in which the others' displayed decisions were mixed (one safe, one risky gamble displayed). Regardless of the order of the mixed information ('Player 1 safe, Player 2 risky', orange; or 'Player 1 risky, Player 2 safe', green), participants' choices were comparable with that of Solo trials (black). Eight participants whose choices yielded no unique solution for the Solo risk preference estimates were excluded from these plots. Error bars show s.e.m.



Supplementary Figure 4

Computer-generated other options have no influence on participants' choices.

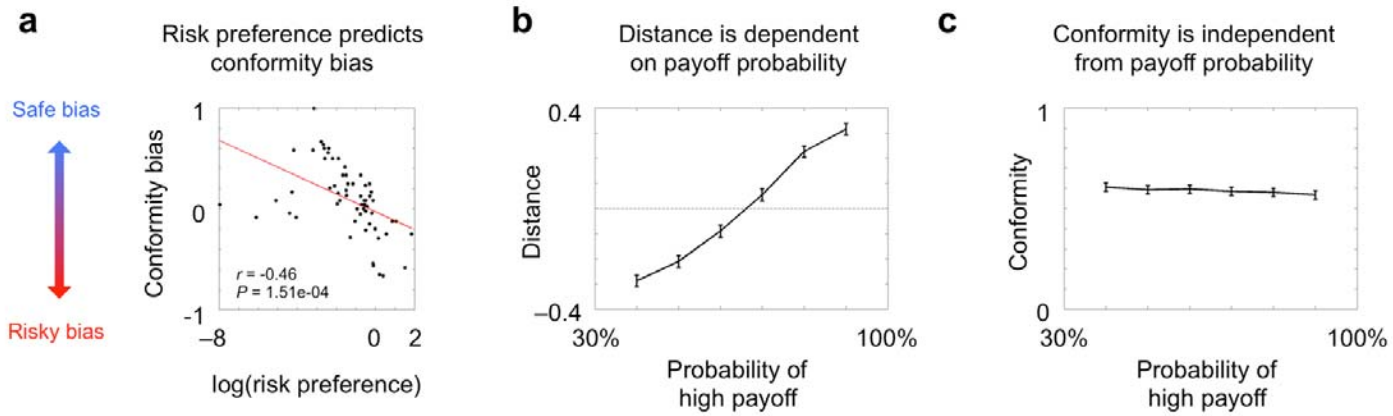
To assess whether the observed influence of others was a social or more general information effect, we implemented a separate behavioral experiment instructing participants that 'Info' trials were computer-generated choices. The visual aspects and trial structure of the original game were maintained, and as in the original task, participants (N=30, no overlap with the N=70 scanned participants) chose between two gambles. Participants were instructed that on some trials (previously the 'Info' trials), prior to the participant's decision, two computers would randomly pick among the options, and these two options would be presented ('Computer Info' trials). As in the original experiment, 'Solo' trials were interspersed with the Computer Info trials. No influence of computer-selected options on participants' choices was observed (repeated measures ANOVA, $F(3, 87) = 0.71$, $P = 0.55$; paired t-tests: Safe vs Solo, $t(29) = 0.61$, $P = 0.55$; Mix vs Solo, $t(29) = 0.90$, $P = 0.37$; Risky vs Solo, $t(29) = -0.52$, $P = 0.37$). Error bars show s.e.m.



Supplementary Figure 5

Other-conferred utility (OCU) predicts asymmetric, risk preference-congruent, conformity: risk-seeking example.

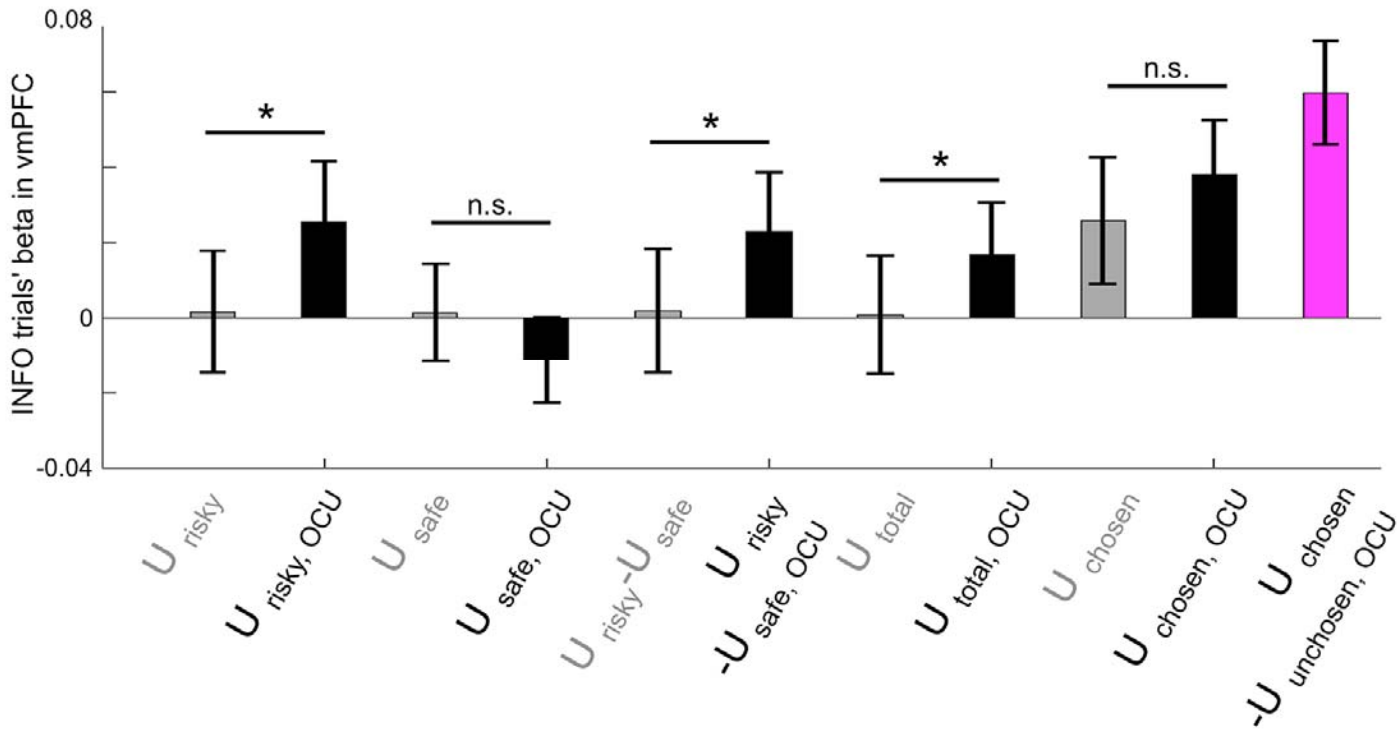
The proposed other-conferred utility model hypothesizes that $U_{with\ OCU} = U_{solo} + OCU$, where OCU is a constant increase in utility of the gamble chosen by others. Depending on the concavity (ρ) of an individual's utility power function, $U_{with\ OCU}$ will exceed a limited range of the U_{solo} predicted gambles; those gambles for which $U_{with\ OCU} > U_{solo}$ have an increased likelihood of being chosen. The model and predictions are schematically depicted here for ρ > 1, risk seeking. The figure shows U_{solo} for a typical risk seeking individual (plotted here using basic power utility function $U(x) = x^{\rho}$ and our top quintile average ρ = 1.48, black line; see **Online Methods** for complete model estimation details). For clarity, we limit our illustration to a single menu of uniformly distributed gambles in which the high and low payoffs for the safe and risky gambles are held constant, but the probabilities vary (per Holt & Laury[10]). The x-axis represents each gamble's U_{solo} value (i.e., $V = U_{solo}^{-1}(EU)$, where EU = expected utility = $[p_{gamble}\ (V_{high\ payoff})^{\rho} + (1 - p_{gamble})(V_{low\ payoff})^{\rho}]$. The reference point ($V_0$) is the value associated with the mean expected utility of safe gambles ($V_0 = U_{solo}^{-1}(EU_{safe})$) which is flanked to the left and right by values associated with risky gambles. When others choose the safe gamble (blue arrow at V_0), OCU is conferred to that option, and the resultant $U_{with\ OCU}(V_0)$ exceeds U_{solo} for originally preferred gambles between V_0 and V_1 (indicated by the blue bar). When others choose the risky gamble (red arrow at V_2, for comparison mirroring V_1 and symmetric around V_0), the resulting $U_{with\ OCU}(V_2)$ exceeds U_{solo} for originally preferred gambles between V_2 and V_3 (indicated by the red bar). Notice that in all cases, OCU from risky others will have influence over a greater range of gambles (red bar) than will OCU from safe others (blue bar; simply: $V_3 - V_2 > V_1 - V_0$), demonstrating that for risk seeking, the influence of risky others will always exceed that of safe others. As detailed throughout, this asymmetry predicts preference-biased conformity when making decisions about uncertain options. The complementary example for risk-averse individuals is shown in the main text, **Fig. 2a**.



Supplementary Figure 6

Risk preference predicts conformity bias; association between distance and conformity is independent from payoff probability.

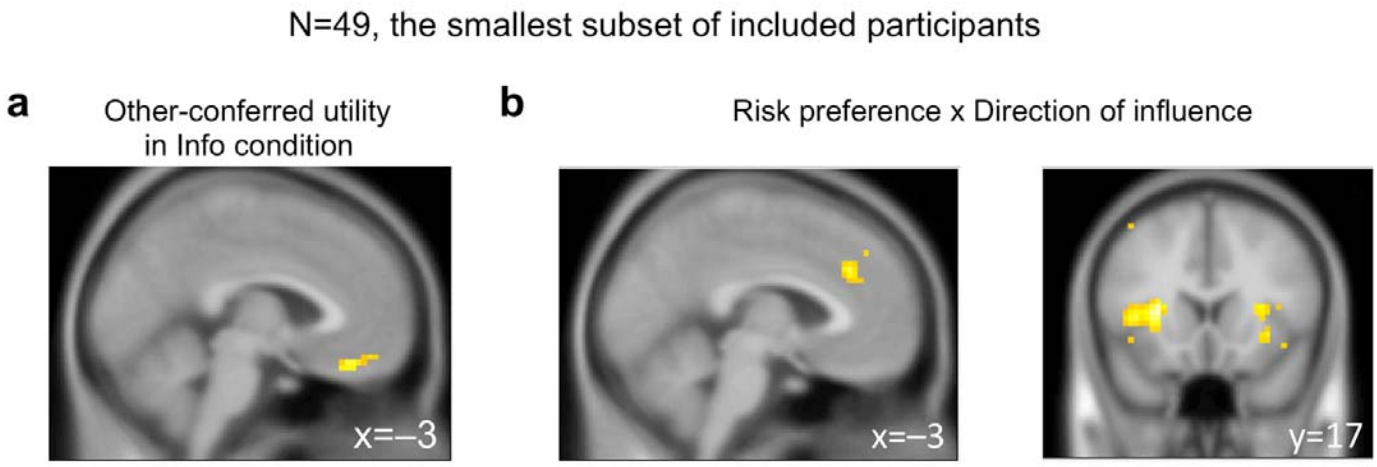
(a) Conformity bias was defined as the conformity difference between 'safe, safe' and 'risky, risky' trials. Individual risk preferences estimated from Solo trials were significantly, negatively correlated with the conformity bias (Pearson's correlation, r = –0.46, *P* = 1.51e–04); risk seeking individuals conformed more when others chose the risky gamble (risky influence), and risk averse individuals conformed more when others chose the safe gamble (safe influence). Each point is an individual participant, and the red line is the regression line between risk preference and conformity bias. **(b)** Because choice behavior in the current task was modeled using a softmax function, distance (difference between others' choices and one's own decision probability), is correlated with probability of earning high payoff. **(c)** However, conformity is not correlated with probability of earning high payoff. These results demonstrate that the association between distance and conformity is independent from payoff probability. Error bars show s.e.m.



Supplementary Figure 7

Increased vmPFC response for OCU-modified variables is consistent across multiple additional variables and greatest for $U_{\text{with OCU}}$ chosen gamble - $U_{\text{with OCU}}$ unchosen gamble (pink).

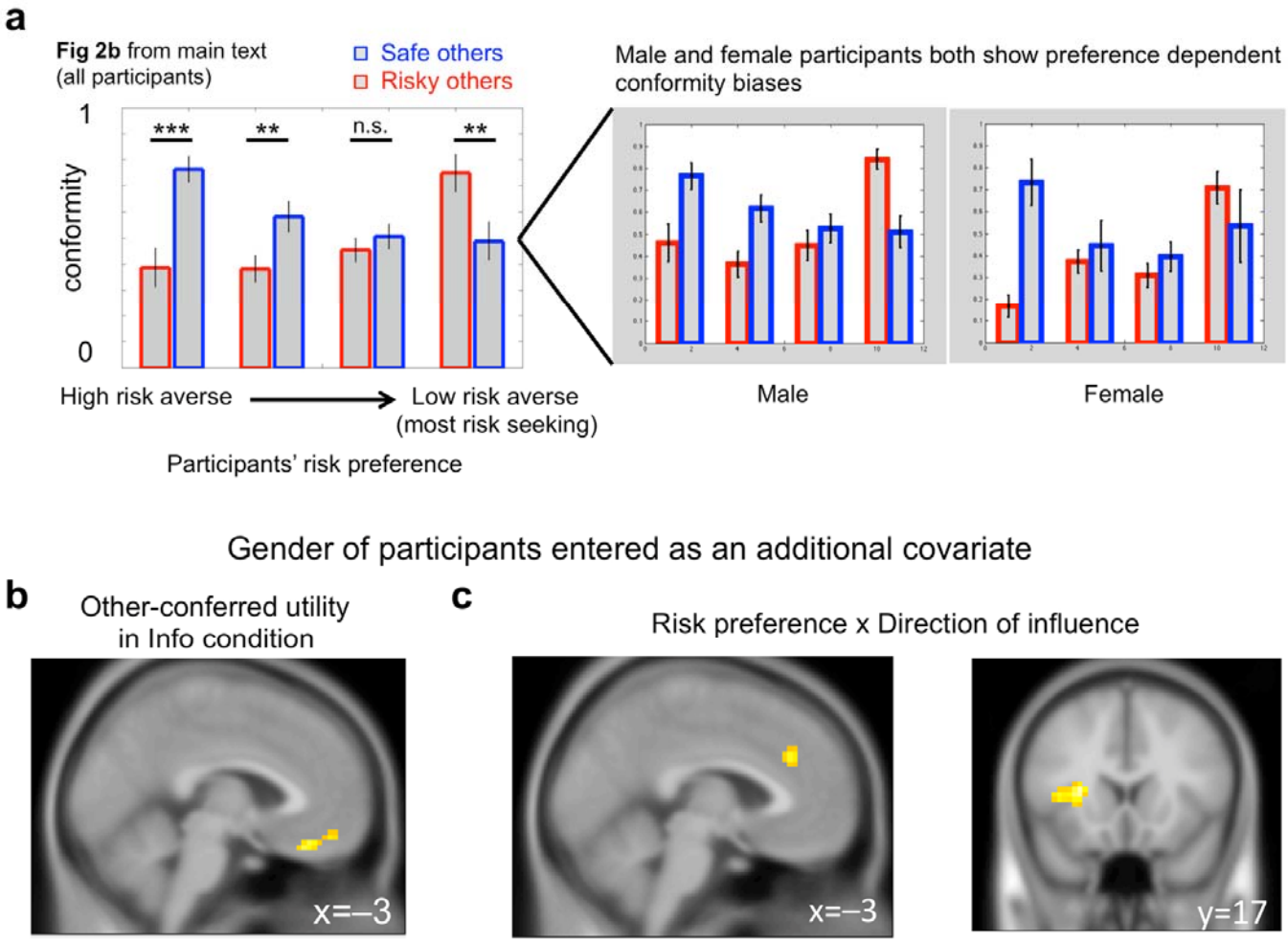
It is possible that other variables than '$U_{\text{with OCU}}$ chosen gamble – $U_{\text{with OCU}}$ unchosen gamble (**Fig. 3ai**)' show an enhanced vmPFC signal when modified by OCU, as $U_{\text{with OCU}}$ is posited to be a closer approximation of participants' subjective value (on Info trials) than is U_{solo}. To address this possibility, we ran several additional analyses with and without OCU modifying several different variables (U_safe, U_risky, U_safe – U_risky, U_chosen, and U_total) to examine whether the OCU-modified utility signals show stronger neural correlates than the unmodified variables. We focused on vmPFC activity in the INFO trials because OCU modification only exists on these trials (for Solo trials, OCU = 0 as there is no information from others). Using these additional regressors, we observed that in *every* case, vmPFC activity for utility differences between the chosen and unchosen gambles (pink, $U_{\text{with OCU}}$ chosen gamble – $U_{\text{with OCU}}$ unchosen gamble) was greater than neural responses associated with each of the other additional regressors (gray bars; using the **Fig. 3ai** cluster as the ROI; paired t-tests: U_{risky}, $t(55) = -2.87$, $P = 0.0059$; U_{safe}, $t(55) = -3.36$, $P = 0.0014$; U_{risky}-U_{safe}, $t(55) = -2.79$, $P = 0.0072$; U_{total}, $t(55) = -2.98$, $P = 0.0043$; U_{chosen}, $t(55) = -2.08$, $P = 0.042$). Equally important, for 4 of these 5 additional regressors, the OCU-modified variable showed at least a trend toward better performance than the un-modified variable (gray vs black bars; paired t-tests: U_{risky}, $t(55) = -2.49$, $P = 0.016$; U_{safe}, $t(55) = 1.28$, $P = 0.21$; U_{risky}–U_{safe}, $t(55) = -2.03$, $P = 0.047$; U_{total} (U_{safe}+U_{risky}), $t(55) = -2.22$, $P = 0.031$; U_{chosen}, $t(55) = -1.32$, $P = 0.19$). The better performance for the OCU-modified variables is notable in its consistency across variables, and provides additional support for our hypothesis that others choices confer subjective value to those options. That is, under this hypothesis, we expected to see stronger vmPFC encoding of OCU-modified variables, given that $U_{\text{with OCU}}$ is posited to be a closer approximation of participants' subjective value (on Info trials) than is U_{solo} alone. In addition, to test the differences between beta for $U_{\text{chosen OCU}} - U_{\text{unchosen OCU}}$ and each of the listed other OCU-modified variables, we ran a series of paired t-tests. The vmPFC beta obtained from $U_{\text{chosen OCU}} - U_{\text{unchosen OCU}}$ was larger than each of the other 5 OCU-modified variables at least at the trend level (each variable tested vs beta for $U_{\text{chosen OCU}} - U_{\text{unchosen OCU}}$, paired t-tests: $U_{\text{risky OCU}}$, $t(55) = -1.68$, $P = 0.099$; $U_{\text{safe OCU}}$, $t(55) = -3.88$, $P = 0.00028$; $U_{\text{risky OCU}} - U_{\text{safe OCU}}$, $t(55) = -1.79$, $P = 0.079$; $U_{\text{total OCU}}$, $t(55) = -2.22$, $P = 0.030$; $U_{\text{chosen OCU}}$, $t(55) = -1.52$, $P = 0.13$). We note that beta for $U_{\text{chosen OCU}} - U_{\text{unchosen OCU}}$ is not necessarily expected to be significantly better than each of the other OCU-modified variables. Specifically, other OCU-modified variables (including and beyond those tested here), may contribute with varying weight to participants' choices. We focused here on beta for $U_{\text{chosen OCU}} - U_{\text{unchosen OCU}}$ as the broadest OCU-modified variable likely to be encoded. It is likely (and suggested by these analyses) that individual differences exist for the types of information to which others choices confer value and that are compiled into a participant's decisions. Unmodified variables are shown in gray, OCU-modified variable are shown in black. Error bars show s.e.m.; * $P < 0.05$, n.s., not significant.



Supplementary Figure 8

Neural other-conferred utility signal and preference-biased responses to direction of others' choices are robust in the smallest subset of included participants.

To check the robustness of the results, we duplicated all analyses leaving out all participants who were excluded in any behavioral model fitting for OCU or Solo risk preferences (due to lacking a unique solution, leaving N = 49); each analysis showed comparable patterns and survived comparable statistical thresholds as for the larger sample reported in the main manuscript. **(a, b)** All neural findings reported the main text **Fig. 3a** and **3c** were duplicated leaving out all participants who were excluded in any individual estimations or for scanning artifacts (leaving N=49 as the smallest subset of included participants). All displayed maps are displayed at P <.001 uncorrected, k > 10 contiguous voxels; the vmPFC and dACC clusters are significant at P < 0.02 FWE, SVC; the insula cluster is significant at P < 0.02 FWE.



Supplementary Figure 9

Risk preference-dependent conformity and neural signatures of other-conferred utility are robust to participants' gender.

(a) Male and female participants showed no between-group differences in either risk preference (independent sample t-test, $t(60) = 0.87$, $P = 0.39$, two-tailed), conformity (independent sample t-test, $t(60) = 1.20$, $P = 0.24$, two-tailed), or conformity bias (independent sample t-test, $t(60) = –0.56$, $P = 0.58$, two-tailed). We also included gender as a covariate in the behavioral analyses to assess potential gender differences in the preference-dependent conformity predicted by the OCU model (per main text **Fig. 2b**). Both males and females show preference-dependent conformity biases, and gender was not a predictor of this pattern (multiple linear regression, $t = –1.15$, $P = 0.25$). **(b, c)** Nonetheless, to evaluate and control for potential gender effects, we also performed additional analyses adding gender as an extra nuisance regressor to the neural general linear model (GLM) analyses presented in the main text. All results with the gender covariate added to the GLM are comparable with those reported in the main text **Fig. 3a** and **3c**. All displayed maps are displayed at $P < .001$ uncorrected, $k > 10$ contiguous voxels; the vmPFC and dACC clusters are significant at $P < 0.02$ FWE, SVC; the insula cluster is significant at $P < 0.02$ FWE; error bars show s.e.m.

Region	Laterality	MNI coordinates			Cluster size k_E	Z
		x	y	z		
Ventromedial prefrontal cortex	L	–3	35	–20	19	4.11

Height threshold: t = 3.25; extent threshold: k = 15 voxels; L: left; clusters are thresholded at P < .001.

Supplementary Table 1

Region showing significant activation positively tracking other-conferred utility in the Info condition when viewing others' decisions

Region	Laterality	MNI coordinates			Cluster size k_E	Z
		x	y	z		
Dorsal anterior cingulate cortex	L	–3	32	31	27	4.04
Insula	L	-27	17	10	96	4.79
Inferior frontal gyrus	R	30	32	–2	25	3.70
Middle frontal gyrus	L	–27	50	10	28	3.89
Middle frontal gyrus/BA9	L	–39	29	37	21	3.47

Height threshold: t = 3.25; extent threshold: k = 15 voxels; L: left; R: right; clusters are thresholded at P < .001.

Supplementary Table 2

Regions showing significant positive interaction between direction of influence (safe vs. risky) and one's estimated risk preference when viewing others' decisions, on trials followed by conforming