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BRIEF REPORT

Listen to Your Heart: When False Somatic Feedback Shapes Moral Behavior

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A pounding heart is a common symptom people experience when confronting moral dilemmas. The authors conducted 4 experiments using a false feedback paradigm to explore whether and when listening to a fast (vs. normal) heartbeat sound shaped ethical behavior. Study 1 found that perceived fast heartbeat increased volunteering for a just cause. Study 2 extended this effect to moral transgressions and showed that perceived fast heartbeat reduced lying for self-gain. Studies 3 and 4 explored the boundary conditions of this effect and found that perceived heartbeat had less influence on deception when people are mindful or approach the decision deliberatively. These findings suggest that the perceived physiological experience of fast heartbeats may signal greater distress in moral situations and hence motivate people to take the moral high road.

Keywords: heartbeat, false feedback paradigm, stress and coping, morality, ethical decision making

Although the heart is simply a myogenic muscular organ found in all animals with a circulatory system, people commonly believe it is the seat of conscience. For example, we often advise others to "listen to your heart" to encourage them to be guided by their inner values. Consequently, heartbeat is featured prominently in literary depiction of difficult moral decisions. For instance, the novel *Crime and Punishment* portrayed Raskolnikov on the night of murder in this way: "His heart beat terribly. . . . He concentrated all his energies on thinking of everything and forgetting nothing; and his heart kept beating and thumping so that he could hardly breathe" (Dostoevsky, 1866/1996, p. 69). In this article, we explore whether and when the mere perception of one's heartbeat can influence behaviors in complex moral dilemmas.

In scholarly endeavors, heartbeat is rarely thought to play any significant role in moral dilemmas. Moral psychology research has long emphasized the role of abstract reasoning and considered physiological experiences such as heartbeat by-products of cognition and deliberation (Haidt, 2001; Monin, Pizarro, & Beer, 2007). Individuals confronting moral dilemmas are thought to make systematic judgments through a conscious, language-based reasoning process (Kohlberg, 1963; Rest, 1986), whereas somatic experiences are, at best, epiphenomenal.

Recent research, however, suggests that heartbeat or the perception of it may play a more prominent role in moral decisions. Damasio (1994) noted that somatic markers, including sensations from both the viscera and the skeletal and smooth muscles, participate directly in value judgments and decisions. The accelerated heartbeat people experience when thinking about an old friend's visit, for example, may reinforce their affection for the friendship and excitement about the reunion. Thus, individuals with problems perceiving or relating to their physiological experiences, such as patients with ventromedial prefrontal cortex damage, have difficulty making adaptive decisions and become antisocial over time (Damasio, Tranel, & Damasio, 1990). Moreover, perceived heartbeat may indicate the level of stress one experiences in a moral dilemma. Moral decisions can be a source of stress when people contemplate actions inconsistent with their moral principles (Wilkinson, 1987), especially when their actions influence others' well-being (Greene, Nystrom, Engell, Darley, & Cohen, 2004). Such stress often manifests as peripheral physiological arousals such as stronger heart contraction and faster heart rate (Teper, Inzlicht, & Page-Gould, 2011). Conversely, the mere perception of fast heartbeat may suggest to people greater arousal and distress in moral dilemmas. Previous research, for instance, showed that perceived changing heartbeat led male participants to experience greater arousal toward erotic images (Valins, 1966).

According to the stress and coping theory (Lazarus & Folkman, 1984), perceived stress should activate psychological coping processes, in which individuals try to either remove the source of stress or regulate stressful emotions (Folkman & Lazarus, 1980). In a moral dilemma, such coping processes may manifest as either conforming to the moral norms and doing the right thing or morally disengaging from the situation. Thus, holding everything else equal (e.g., the ability to morally disengage; Bandura, Bar-

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baranelli, Caprara, & Pastorelli, 1996), we expect that perceived fast (vs. normal) heartbeat would lead individuals to exhibit more moral behavior. Consistent with this prediction, Dienstbier and Hunter (1971) showed that people cheated more when they attributed their peripheral stress symptoms to external causes, presumably because the external attribution reduced their perceived distress of the moral decision.

Further, if perceived fast heartbeat can indeed increase ethical behaviors by signaling greater distress in moral dilemmas, we should expect this effect to be weaker when individuals are less affected by stress signs. Both individual differences and situational factors may influence the extent to which people are affected by stress signs. Mindful individuals, for example, observe their thoughts, emotions, and body sensations in a receptive and nonreactive way (Brown & Ryan, 2003). Mindfulness can create a mental gap that buffers the influence of physiological sensations and prevents automatic and impulsive reactions (Brown, Ryan, & Creswell, 2007). Indeed, more mindful individuals are less influenced by physiological compulsions such as binge eating disorder (Telch, Agras, & Linehan, 2001) and substance addiction (Hayes et al., 2004). We thus expect perceived heartbeat to have less influence on moral behaviors among more mindful individuals. Similarly, research on dual process models has long discovered that systematic and deliberative processes can interfere with automatic and emotional processes (e.g., Schlenker, 1987; Schooler, Ohlsson, & Brooks, 1993; Wilson & Schooler, 1991). Consistent with this notion, deliberative decision making has been found to reduce the influence of moral emotions such as guilt and increase unethical behavior (Small, Loewenstein, & Slovic, 2007; Zhong, 2011). Consequently, we expect that perceived heartbeat may also have less influence on moral behaviors when people approach moral dilemmas rationally and deliberatively.

We tested whether perceived fast (vs. normal) heartbeat would increase ethical behaviors and examined the boundary conditions of such influence. By examining both individual difference and situational factors as potential moderators, we hope to shed light on the distress signaling mechanism through which perceived fast heartbeat increases ethical behaviors. In four experiments, we adapted a false physiological feedback paradigm from previous studies (Batson, Engel, & Fridell, 1999; Valins, 1966) and immersed participants in their "own" heartbeat while confronting them with moral decisions. In Studies 1 and 2, we examined whether perceived fast (vs. normal) heartbeat influences individuals' behaviors in complex moral dilemmas. In Studies 3 and 4, we examined whether this effect would be attenuated when individuals are less affected by perceived stress signs.

Study 1

In Study 1, we tested the effect of perceived heartbeat in a moral dilemma in which participants decided whether to volunteer for a good cause at the expense of their time. While listening to fast or normal heartbeat, participants read a volunteer recruitment letter for an anti-discrimination study and decided whether to volunteer. We predicted that participants who listened to fast (vs. normal) heartbeat would be more likely to volunteer.

Eighty-six undergraduates (67% women, M_{age} = 21 years, SD = 4.84 years) from the University of Toronto completed a 15-min study for $5. On arrival, each participant was led to a computer station in a cubicle. Participants were first asked to test heart rate measuring equipment for an unrelated study, which included a bogus remote heart rate monitor in the form of an electronic watch, a signal receiver attached to the computer, and a headset. Participants were asked to wear the monitor on the wrist and listen to the heartbeat sound through the headset. To manipulate perceived heartbeat, we played a prerecorded heartbeat sound through the headset. Participants were randomly assigned to the normal (60 beats/min) or fast (96 beats/min) heartbeat condition. These two paces were selected according to the American Heart Association's (2012a, 2012b) definition of normal and high heart rates.

While listening to the heartbeat, participants read a volunteer recruitment letter, which summarized research evidences of discrimination against gay and lesbian employees and called for research volunteers for a 30-min study to demonstrate the negative consequences of such discrimination (see Appendix). They indicated whether they would volunteer by checking *Yes* or *No*. Those who checked *Yes* also wrote down their names and e-mail addresses. They reported their demographics before being debriefed and dismissed. As expected, participants who perceived fast heartbeat volunteered more often (39.5%) than did those who perceived normal heartbeat (17.1%), $\chi^2 = 4.93$, $p = .026$, $V = .25$.

Study 2

Study 1 showed that when people were contemplating whether to spend valuable personal time to volunteer for a good cause, listening to fast (vs. normal) heartbeat increased the rate of volunteering. Our theory makes predictions about moral behaviors in general, and thus similar effects should be observed on deterring unethical behaviors. In Study 2, we examined whether perceived fast (vs. normal) heartbeat would reduce deception.

Method

Sixty-five undergraduates (55% women, M_{age} = 23.4 years, SD = 5.2 years) from the University of Toronto volunteered for a 15-min study for $5. We used the identical perceived heartbeat manipulation as in Study 1. Participants then engaged in an ostensible interaction with an anonymous other in which they could lie to gain more money. In the deception game (Gneezy, 2005), participants were led to believe that they were randomly paired with a counterpart in a different room who would choose one of two payment options: Option A pays participants $8 and the counterpart $2; Option B pays participants $2 and the counterpart $8. They were told the counterpart would choose without knowing the payment structure and they could send a message to influence the counterpart's decision. They could send either a true message ("Option B gives you more benefit") or a lie ("Option A gives you more benefit"). The instruction emphasized that the counterpart would not know the payment of the option not chosen. Participants put their message in a sealed envelope, which was then collected by the experimenter. Because our prediction concerned only participants' deceptive behavior, there was no counterpart. Before being debriefed and dismissed, participants rated the speed of the heartbeat they heard on a 7-point scale (1 = *very slow*, 4 = *medium*, 7 = *very fast*) as a manipulation check and reported their demographic information.

Results

Two participants suspected the authenticity of the heartbeat manipulation and were excluded from the analysis.[1] Manipulation checks showed that participants in the perceived fast heartbeat condition heard faster heartbeats ($M = 5.56$, $SD = 1.08$) than did those in the perceived normal heartbeat condition ($M = 4.43$, $SD = 0.90$), $t(60) = 4.47$, $p < .001$. More important, participants who perceived fast heartbeat lied less (31.3%) than did those who perceived normal heartbeat (58.1%), $\chi^2 = 4.59$, $p = .032$, $V = .27$.

Study 3

Studies 1 and 2 showed that perceived fast (vs. normal) heartbeat increased volunteering and deterred deception, presumably because perceived fast heartbeat signaled greater stress in moral dilemmas. In Study 3, we tested this assumption by examining whether this effect would be attenuated among mindful individuals who are less influenced by (perceived) physiological signs.

Method

Sixty-nine undergraduates (66.7% women, $M_{age} = 23.8$ years, $SD = 5.1$ years) from the University of Toronto volunteered for a 30-min study for $5. One week before the experiment, they completed a mindfulness scale online (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006) that measured their tendency to step back and refrain from responding behaviorally to feelings and thoughts. The seven-item scale ($\alpha = .83$) contained items such as "I perceive my feelings and emotions without having to react to them." The rest of the procedure was identical to that of Study 2.

Results

Two participants suspected the authenticity of the heartbeat manipulation and were excluded from the analysis. Including them did not change our results. We replicated the main effect of perceived heartbeat: Those who perceived fast heartbeat lied less (47.2%) than did those who perceived normal heartbeat (71.0%), $\chi^2 = 3.86$, $p = .049$, $V = .24$. We also found a marginally significant trend that more mindful participants lied less ($B = -1$, $SE = 0.54$, $Wald = 3.46$, $p = .063$). This is consistent with previous research showing that experimental mindfulness-based intervention increased empathic perspective taking (Birnie, Speca, & Carlson, 2010).

More important, a binary logistic regression analysis of deception (0 = no deception, 1 = deception) with perceived heartbeat (−1 = normal, 1 = fast), mindfulness (mean centered), and the interaction term as predictors revealed a significant interaction between perceived heartbeat and mindfulness, $B = 2.41$, $SE = 1.07$, $Wald = 5.04$, $p = .025$, $\eta^2 = .46$. Simple slope analyses (Aiken & West, 1991) showed that for less mindful participants (1 standard deviation below the mean), perceived fast (vs. normal) heartbeat reduced deception, $B = -3.16$, $SE = 1.14$, $Wald = 7.73$, $p = .005$, odds ratio (OR) = 0.04; for mindful participants (1 standard deviation above the mean), however, perceived fast (vs. normal) heartbeat did not reduce deception, $B = 0.02$, $SE = 0.75$, $Wald = 0.01$, $p = .98$, $OR = 1.02$ (see Figure 1).

Although these results are largely consistent with our prediction, the use of individual difference measures as moderators is less than ideal because mindfulness may have independent effects on moral behaviors in addition to buffering individuals from physiological reactions (as suggested by the marginal main effect). Additionally, mindfulness may also be correlated with unmeasured variables that may drive the effects. To mitigate this limitation, we conducted Study 4, in which we experimentally manipulated individuals' tendency to discount stress signals by subtly priming them to think deliberatively or intuitively.

Figure 1. Perceived heartbeat and mindfulness interaction in Study 3.

Study 4

In Study 4, we examined whether participants induced to think deliberatively would be less influenced by perceived heartbeat when choosing whether to lie. To manipulate deliberative versus intuitive thinking, we subtly framed the deception game as a "decision-making" or an "intuitive reaction" task (Zhong, 2011). Compared with *intuitive reaction*, the term *decision making* may reduce the influence of emotions and physiological reactions because the words *decide* and *decision* originally came from the judicial context, where judgments and verdicts are consciously deliberated on the basis of facts, not emotions and feelings. This view of decision making as a conscious and analytic process dominates the academic and popular culture (e.g., Dijksterhuis & Nordgren, 2006; Nisbett & Ross, 1980) and can be seen as a cultural value that is institutionalized in political, legal, and school systems. Thus, we predicted that perceived fast (vs. normal) heartbeat would reduce deception only when the choice was framed as an intuition, not when it was framed as a decision.

Method

One hundred seventy-four undergraduates (55.7% women, $M_{age} = 20.6$ years, $SD = 2.3$ years) from the University of Toronto volunteered for a 20-min study for a course credit. They were randomly assigned to the decision or intuition condition. The rest of the procedure was the same as those in Studies 2 and 3 except that the deception game was administered through a computer program.

[1] Analyses including these two participants yielded similar results: 33.3% and 59.4% in the fast and normal heartbeat conditions, $\chi^2 = 4.43$, $p = .035$.

Results

Six participants suspected the authenticity of the heartbeat manipulation and were excluded from the analysis. Including them did not change the results. There was no main effect of framing (58.5% and 51.2% in the decision and intuition conditions, respectively; $\chi^2 = 0.92$, $p = .34$, $V = .10$) or heartbeat (49.4% and 59.3% in the fast and normal heartbeat conditions, respectively; $\chi^2 = 1.68$, $p = .20$, $V = .07$) on deception. However, as predicted, a binary logistic regression analysis of deception (0 = no deception, 1 = deception) with perceived heartbeat (−1 = normal, 1 = fast), framing (−1 = decision, 1 = intuition), and the interaction term as predictors revealed a significant interaction between framing and perceived heartbeat manipulation, $B = -0.33$, $SE = 0.16$, $Wald = 4.29$, $p = .038$, $\eta^2 = .63$. Simple slope analyses revealed that under intuition framing, perceived fast (vs. normal) heartbeat reduced deception, $B = -0.52$, $SE = 0.22$, $Wald = 5.46$, $p = .019$, $OR = 0.59$, replicating our previous studies; under decision framing, however, perceived fast (vs. normal) heartbeat did not reduce deception, $B = 0.14$, $SE = 0.23$, $Wald = 0.37$, $p = .55$, $OR = 1.15$ (see Figure 2). Note that we found no main effect of framing or perceived heartbeat. This should not be surprising because we manipulated both factors and predicted an interaction in which perceived heartbeat only influences deception under intuition framing.

General Discussion

In four experiments, we found that, when perceiving fast (vs. normal) heartbeat, participants volunteered at a higher rate to help stigmatized minorities and refrained more from deceiving others for self-interest. Further, perceived heartbeat influenced deception less when individuals were mindful and when they approached the decision deliberatively, presumably because mindfulness and deliberation buffered them from stress signs. These results support our prediction that perceived fast heartbeat signals greater stress in moral situations and activates coping mechanisms that result in more conformity to moral norms. Our findings are consistent with Damasio's (1994) findings that somatic markers play important roles in moral regulation as well as with embodied morality research showing that tactile sensory experiences influence moral evaluations and decisions (Sherman & Clore, 2009; Zhong & Liljenquist, 2006; Zhong, Strejcek, & Sivanathan, 2010).

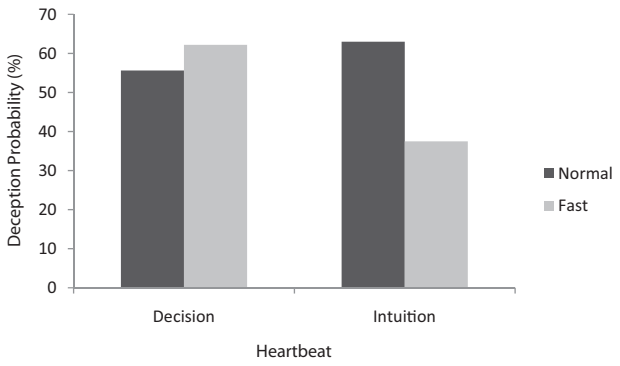

Figure 2. Perceived heartbeat and framing interaction in Study 4.

Our findings extend previous research on arousal misattribution. Physiological arousal was considered a valence-free state that could be cognitively interpreted into different emotional expressions (Schachter & Singer, 1962). For example, arousal from injection of adrenaline may induce excitement or fear depending on situational cues (Schachter, 1959). Unlike these studies in which the researchers focused on simple attribution and interpretation of emotion stimuli after arousal (Schachter & Singer, 1962; Valins, 1966), we focused on the behavioral consequences of perceived physiological activities in complex moral decisions with real monetary incentives and strong social norms. In addition, unlike previous studies in which researchers focused on the effect of arousal, we also showed that perceiving no arousal (i.e., normal heartbeat) would license unethical behaviors such as deception.

One limitation of the current studies is that we did not monitor people's real heartbeat during and after decision making. Although unlikely (Valins, 1966), it is possible that our results may be due to real physiological changes after listening to false heartbeat feedback. Future research should track real-time heartbeat to rule out this alternative explanation and more generally explore the role of real heartbeat in moral decisions. Alternatively, future research could directly manipulate real heartbeat (e.g., through exercising) to test its effect on moral behavior.

The moderating role of decision framing in Study 4 deserves further consideration. Rational decision making is typically discussed for its positive consequences such as mitigating the influence of "hot" emotions and reducing impulsive behaviors (LeDoux, 1996; Tversky & Kahneman, 1983). Our findings show that it may also mask the influence of perceived physiological experiences such as heartbeat that could otherwise increase ethical behavior. Future research could explore similar moderators such as *somatosensory abilities* or *interoception* (i.e., the extent to which one can experience and attend to somatic and visceral sensations). Individuals low in such abilities might be less influenced by perceived heartbeat, because they lack the experience of sensations in stressful situations and are thus less likely to interpret perceived heartbeat as an indicator of situational stress.

Raskolnikov was not alone in believing that his intellect could dominate his visceral reactions to transgression; people can be overly confident in the judgments and justifications of their rational mind and engage in behaviors that would otherwise be sanctioned by their heart. However, just as Raskolnikov eventually succumbed to powerful emotions and turned himself in, the current research reveals that perceived physiological experiences play an important role in influencing moral behaviors—listening to your heart may indeed shape ethical behaviors.

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(*Appendix follows*)

Appendix

Volunteer Recruitment Letter Used in Study 1

Dear participants,

My name is Jason Lee. I am a researcher from the Rotman School of Management. My research focuses on workplace unfairness, particularly surrounding unfair treatments toward minority members such as homosexuals.

In general, about 10%–14% of the North America workforce is composed of homosexual employees. Past studies have found that homosexual workers are often treated unfairly at the workplace. Compared to heterosexuals, homosexuals face more difficulties in job searching. According to the *National Gay and Lesbian Task Force Survey*, 62% of gay men and 59% of lesbians report that they experience employment discrimination during interview and recruitment. In addition, homosexuals often receive unfair financial compensation. In a paper published in *Industrial and Labor Relations Review* (1995), Dr. Badgett found that gay and bisexual male workers earned up to 27% less than heterosexual male workers with the same experience, education, occupation, marital status, and region of residence. The same trends were found for lesbian and bisexual women.

Furthermore, homosexuals are more likely to be the target of physical abuse at workplace. Not only homosexual students are frequently bullied and beaten up by others on campus but also homosexual employees frequently become targets of severe workplace violence and aggression in North America. Although overt discriminations against homosexual employees have been reduced in recent years, covert discriminations such as social exclusion of gays and lesbians are still prevalent in a lot of organizations. To avoid discrimination and harassment, many homosexual employees choose to conceal their homosexuality, which damages both their psychological and physical well-being.

My research focuses on revealing unfair treatments of homosexual minorities at the workplace and their negative consequences. By achieving this we can draw people's attention to these important issues and bringing positive changes. To accomplish this, we are looking for volunteer participants to conduct some preliminary studies. Would you be willing to volunteer for a 30-min research session in the next few weeks? You will not receive any monetary compensation but your participation can contribute to reducing inequity at workplace and improving the work environment of homosexual minorities.

If you are willing to volunteer, please check the first box and write down your name and e-mail in the place provided, otherwise please check the second box.

□ Yes I want to volunteer for the study about injustice at the workplace

Name _____

E-mail_____

□ No I do not want to volunteer for the study about injustice at the workplace

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