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"The mind is willing, but the flesh is weak":

The effects of mind-body dualism on health behavior

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Abstract

Beliefs in mind-body dualism – i.e., perceiving one's mind and body as two distinct entities – are evident among virtually all human cultures. Despite their prevalence, surprisingly little is known about the psychological implications of holding such beliefs. The current research investigated the relationship between dualistic beliefs and health behavior. We theorized that dualism leads people to perceive their body as a mere 'shell' and, thus, to neglect that body. Supporting this hypothesis, participants who were primed with dualism (vs. physicalism) reported less engagement in healthy behaviors and less positive attitudes toward such behaviors. Additionally, the bidirectionality of this link was investigated. Activating health-related concepts affected participants' subsequently reported metaphysical beliefs in mind-body dualism. A final set of studies demonstrated that participants primed with dualism make real-life decisions that may ultimately compromise their physical health (e.g., consuming unhealthy food). We conclude by discussing potential implications for health interventions.

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Introduction

"That which is born of the flesh is flesh; and that which is born of the spirit is spirit" (John 3:5-6).

For centuries, the question regarding the relation of body and mind has been a matter of debate among philosophers, theologians and natural scientists alike. It was first extensively discussed by 16th century French philosopher René Descartes, who argued that minds and physical bodies are two distinct – yet causally interacting – entities (Descartes, 1641). Cartesian dualism describes the mind as an immaterial substance qualitatively different from physical substances, and although most contemporary scientists reject the notion of such a substance dualism and take up a strictly physicalistic (i.e., material monistic) position, there is growing evidence that humans are, in fact, "natural born dualists" (Bloom, 2004).

Beliefs in mind-body dualism can be found in virtually all human cultures, allowing for beliefs in heaven and hell, reincarnation, and spirits of deceased family members (Bering, 2006; Bloom, 2007). These beliefs share the dualistic view of a mind that can exist independently of the body it formerly "occupied" (Boyer, 2001). Only if people assume that minds and bodies are two conceptually different entities can they believe that one can exist without the other.

Phenomenologically, we all perceive our minds to be qualitatively different from our bodies. We know that our thoughts and emotions remain private, while our bodies are perceptible to the outside world. Even 3-year-olds are able to understand that their knowledge and sensations are exclusively accessible to themselves – for example, when feigning injury to evoke empathy (Antony, 2006) or when being deliberately deceptive (Hala, Chandler, & Fritz, 1991). We experience dreams in which we see and feel in the absence of material stimulation, and a considerable number of people report having experienced feelings of

dissociation from their bodies – for example, in life-threatening situations (Noyes Jr. & Kletti, 1977).

Yet, in marked contrast to this prominent role of dualism in human experience stands its neglect in psychological research. To date, little is known about how dualistic beliefs shape human judgment, affect, and behavior. One notable exception to this neglect is research examining the cognitive foundation on which these beliefs are grounded.

In order to predict behavior, people have the innate tendency to attribute conscious thoughts and intentions to others. By age one, children can already identify an agent's goals and causally attribute the agent's actions to the pursuit of these goals (Gergely, Nádasdy, Csibra, & Bíró, 1995). With the development of a "theory of mind", children are able to attribute mental states different from their own to someone else (Wellman, Cross, & Watson, 2001). Consequently, while we perceive most non-human entities as bodies without minds, we readily attribute to other human beings a mind that we cannot directly perceive with our senses. It is this evolutionarily-acquired skill to differentiate between observable bodies and unobservable minds that renders dualistic beliefs possible (Povinelli & Bering, 2002). In accordance, Bloom (2007) describes dualistic beliefs as an evolutionary accident, "a natural by-product of the fact that we have two distinct cognitive systems, one for dealing with material objects, the other for social entities. These systems have incommensurable outputs" (p. 149). This notion is further supported by neuroscientific research demonstrating that a region in the human temporo-parietal junction is specifically involved in reasoning about the content of other people's minds, as opposed to – for example – their mere physical presence (Saxe & Kanwisher, 2003).

Additionally, research in developmental psychology suggests that these two basic modes of construal inherently promote the formation of dualistic beliefs. In one study, kindergartners, who were told a story about an anthropomorphized mouse that was eaten by

an alligator, more frequently ascribed to the dead mouse continuing emotional and epistemic states than biological or perceptual states, indicating a belief in the continuing existence of the mind after the appendant body ceased to exist (Bering & Bjorklund, 2004). Similarly, preschoolers do understand that one needs a brain for thinking or remembering (Johnson & Wellman, 1982), but they regard it as a tool, much like a calculator, that is not responsible for things such as pretending to be a kangaroo or loving one's brother (Lillard, 1996; Bloom, 2004). That is, they readily differentiate between what *they* do and what their brains do. Only later in their development do children acknowledge that the brain is the source of their emotions, thoughts, and identity (Johnson, 1990).

Lately, people's fundamental beliefs about themselves and the world have attracted an increased focus of attention in psychological research, and have been shown to critically shape the way they think, feel, and behave. This emerging field includes, for example, research on beliefs in a just world (Callan, Kay, Davidenko, & Ellard, 2009), beliefs in incrementalism (Kammrath & Peetz, in press), and naive theories of intelligence (Miele & Molden, 2010). Similarly, more metaphysical beliefs, such as beliefs in free will or determinism, have been investigated with regard to their cognitive foundations (Aarts & van den Bos, 2011), as well as their effects on various cognitions and behaviors, including moral behavior (Vohs & Schooler, 2008) and interpersonal aggression (Baumeister, Masicampo, & DeWall, 2011).

One might assume that beliefs in mind-body dualism would show a significant overlap with some of the beliefs described above. In fact, the notion of mind-body dualism intuitively seems related to beliefs in free will, as both constitute metaphysical beliefs related to one's self construal. It is, however, equally feasible to imagine that a dualist and a physicalist share a deterministic view of the world, and only differ with respect to the specific type of causation (i.e., scientific vs. fatalistic determinism; Paulhus & Carey, 2011). In line with our theoretical

reasoning, preliminary data indicates that measures of mind-body dualism and free will and determinism are indeed largely uncorrelated (supplementary materials).

Additionally, as argued before, research in the developmental domain has demonstrated that beliefs in dualism are rooted in our basic cognitive architecture. In contrast, more sophisticated – and less intuitively accessible – beliefs such as beliefs in free will or determinism, as well as religious or philosophical beliefs, seem to be influenced by culturally shared knowledge to a greater extend. They are acquired in later developmental stages and may themselves partially rely on one's dualistic setup (Bloom, 2007). Thus, we argue that it is unlikely that the notion of mind-body dualism can sufficiently be understood by solely assessing these "higher-order beliefs".

Dualism and Health

Although it is evident that the processes facilitating mind-body dualism are fundamentally rooted in our cognitive system, surprisingly little research has focused on the effects of beliefs in mind-body dualism on every-day judgment and behavior. Given that all humans are endowed with the same cognitive subsystems that enable the development of dualistic beliefs, it can be assumed that the potential for these beliefs is present in all humans and can thus be triggered by relevant situational cues.

As dualistic beliefs primarily concern one's relationship with one's body, they should be particularly influential for behavior that is directly related to the body. If one perceives one's mind to be independent of – and not emerging from – one's body, this body becomes nothing but a vessel or a tool that helps the mind interact with the physical world. Given that people perceive experience and agency as the essential characteristics of a living human being (Gray, Gray, & Wegner, 2007), and therefore generally value minds over bodies (Gray, Knickman, & Wegner, 2011), any potential harm to one's body might – for a dualist – be neglectable. Whether people feel the need to protect their bodies in order to protect their

minds or whether they feel that their highly-valued minds are invulnerable to physical harm should thus directly affect how they treat their own bodies in daily life. The present research was designed to examine this possibility.

Specifically, we hypothesized that the more people perceive their minds and bodies as distinct entities, the less they engage in behaviors that protect their bodies. Initial data indicated that self-reported beliefs in mind-body dualism and health behavior are indeed correlated (supplementary materials). Studies 1 and 2 used various priming procedures to establish a causal link between both concepts. Study 3 tested the possibility that confronting people with unhealthy (vs. healthy) behavior may in turn affect their dualistic beliefs. To test for behavioral implications, the last two studies investigated whether participants primed with dualism make decisions that may ultimately compromise their physical health (e.g., to choose an unhealthy meal for lunch).

Study 1: Dualism Priming and Health-Related Behavior

Our first study used a priming procedure to experimentally manipulate the extent to which participants hold dualistic beliefs when reporting their health behavior. We hypothesized that participants primed with dualism would report engaging less in health-related behaviors than would participants primed with physicalism.

Method

Participants and design. Sixty-six German-speaking participants (40 females; M_{Age} = 26.79 years, SD = 5.56) recruited from a pool for online data-collection were given the chance to win a gift certificate by enrolling in a lottery. Participants were randomly assigned to either a dualism or a physicalism priming condition.

Materials and procedure. Ostensibly to pre-test textbook materials, participants in the dualism priming condition read a text on mind-body dualism (322 words), whereas participants in the physicalism priming condition read a text on physicalism (312 words). The

vignette in the dualism condition concluded "In sum, the term 'mind-body dualism' describes the proposition that a person's mind and body are two distinct entities." The vignette in the physicalism condition concluded "In sum, the term 'physicalism' describes the proposition that a person's mind and body are both rooted in the same physical substances." Both vignettes were designed to be structurally equivalent. They included similar arguments and examples, only differing with regard to the specific framing.

Subsequently, participants responded to a one-item measure of mind-body dualism that served as a manipulation-check. We adapted a pictorial measure developed by Aron, Aron, and Smollan (1992) and modified by Schubert and Otten (2002). The item consisted of seven diagrams. Each diagram consisted of two circles, vertically centered on a horizontal line. From top to bottom, the circles got closer. We labeled the left circle "body", and the right circle "mind". The instructions asked participants to indicate which of the different constellations best represents their idea of how their body relates to their mind. High values on this measure indicate strong dualistic beliefs.

Finally, participants answered a questionnaire including 26 items describing health-related activities. We constructed this questionnaire to cover multiple dimensions of health-related behavior, including *food* (e.g., "I limit the amount of fat I eat"), *health care* (e.g., "I regularly go for routine medical check-ups"), *sports* (e.g., "I regularly go to the gym"), and *hygiene* (e.g., "I always wash my hands after I went to the bathroom"). On a scale from 1 (*not at all*) to 9 (*very much*), participants indicated their agreement with each of the statements. Participants' responses were combined to calculate an overall health score ($\alpha = .71$).

Results and Discussion.

Our priming procedure successfully induced the intended beliefs regarding the relationship between mind and body. Participants in the dualism priming condition ($M = 3.31$,

SD = 1.03) reported a stronger dualistic belief than did participants in the physicalism priming condition (*M* = 2.67, *SD* = 1.21), $t(64) = 2.32$, $p = .024$, $d = .57$.

Essential to our hypothesis, participants in the dualism priming condition (*M* = 5.10, *SD* = 0.90) reported less engagement in health-related behaviors than did participants in the physicalism priming condition (*M* = 5.52, *SD* = 0.75), $t(64) = -2.02$, $p = .047$, $d = -.51$ (Figure 1).

Study 2: Dualism Priming and Health-Related Attitudes

Study 2 was designed to extend these findings methodologically and conceptually by (a) using a different priming procedure and (b) assessing attitudes toward health behavior. As participants primed with dualism seem to be less likely to engage in healthy behaviors, we also predicted that they would report less positive – and thus behavior-consistent – attitudes toward such behaviors compared to participants primed with physicalism.

Method

Participants and design. Thirty male participants (M_{Age} = 36.00, *SD* = 14.37) recruited from Mechanical Turk (MTurk; see Buhrmester, Kwang, & Gosling, 2011) received modest monetary compensation. Participants were randomly assigned to either a dualism or a physicalism priming condition.

Materials and procedure. Ostensibly to investigate linguistic capabilities, we asked participants in both priming conditions to unscramble 16 scrambled sentences. Eight sentences in the dualism priming condition were related to dualism (e.g., "Mental states are different from brain states"), whereas eight sentences in the physicalism priming condition were related to physicalism (e.g., "Mental states are based on brain states"). Subsequently, participants completed a modified version of the previously used health questionnaire. To assess attitudes toward health-related behaviors, we asked participants to indicate how much they agree that 26 health-related activities (e.g., "to prepare food yourself instead of buying

oven-ready meals") are important to them, on a scale ranging from -4 (*do not agree*) to +4 (*very much agree*). Participants' responses to the health items were collapsed to calculate an overall health-attitude score ($\alpha = .77$).

Results and Discussion

Consistent with our hypothesis, participants primed with dualism ($M = 0.84$, $SD = 0.98$) reported less positive attitudes toward healthy behavior than did participants primed with physicalism ($M = 1.43$, $SD = 0.55$), $t(22.08) = -2.05$, $p = .053$, $d = -.74$ (Figure 1).

Study 3: Health Priming and Dualism Measure (Reversed Link)

Having established a link between dualism and health-related attitudes and behavior, Study 3 was designed to examine whether this link is bidirectional. As we have argued above, dissociative tendencies have been linked to life-threatening experiences (Noyes & Kletti, 1977), and have been described as a coping strategy in cases of traumatic events during childhood (Agargun et al., 2003). Here, we argue that confronting people with stimuli generally associated with potentially harmful activities (such as unhealthy behavior) may increase their tendency to dissociate their minds from their bodies, thereby affecting their metaphysical beliefs.

More specifically, we hypothesized that participants primed with health-constraining images would report stronger dualistic beliefs than would participants primed with health-sustaining images.

Method

Participants and design. Twenty-nine participants (26 females; $M_{Age} = 22.89$, $SD = 2.63$) recruited from the same online study pool as in Study 1 were randomly assigned to either a health-constraining or a health-sustaining priming condition.

Materials and procedure. In the health-constraining priming condition, participants viewed eight pictures related to health-constraining concepts (e.g., pictures of unhealthy food

like ice-cream and oven-ready meals), whereas in the health-sustaining priming condition, participants viewed eight pictures related to health-sustaining concepts (e.g., pictures of healthy food like fruits and vegetables). Finally, participants indicated the degree of their dualistic belief on the same pictorial rating item used in Study 1.

Results and Discussion

In accordance with our prediction, participants primed with health-constraining images ($M = 4.08$, $SD = 1.32$) reported a stronger dualistic belief than did participants primed with health-sustaining images ($M = 3.06$, $SD = 1.24$), $t(27) = 2.13$, $p = .042$, $d = .80$.

This finding not only provides evidence for the bidirectional nature of the link between mind-body dualism and health, but further suggests that metaphysical beliefs may indeed function as powerful cognitive tools to cope with threatening experiences and dysfunctional behavior.

Study 4: Actual Health Behavior (Book Choice)

The studies reported thus far have established a bidirectional link between dualism and self-reported health attitudes and behavior. Study 4 focused on a concrete health-related behavior, thereby moving beyond participants' self-reports. Participants were again primed with either dualism or physicalism and at the end of the experiment were asked to select one out of four books as compensation for participation. Two books were cookbooks on unhealthy food, whereas the other two books were cookbooks on healthy food. We reasoned that selecting the unhealthy cookbook reflects an increased likelihood of consuming the corresponding unhealthy food – or at least the willingness to do so.

We thus predicted that participants in the dualism priming condition would be more likely to choose one of the unhealthy cookbooks than would participants in the physicalism priming condition.

Method

Participants and design. Forty-two participants (40 females; M_{Age} = 25.07, *SD* = 3.58) drawn from the same pool as in Studies 1 and 3 were randomly assigned to either a dualism or a physicalism priming condition.

Materials and procedure. Participants completed the same priming procedure as in Study 1. Upon an unrelated filler task, participants were given the opportunity to enroll in a lottery to win a book. Out of a selection of four cookbooks, they were asked to choose one book to be sent to them in case they won the lottery. Two of the cookbooks were related to unhealthy food (i.e., barbecue and dessert), and two books were related to healthy food (i.e., vegetarian and organic).

Results and Discussion

Overall, thirty-three participants (78.57%) decided to enroll in the lottery and to choose one of the four books.

Confirming our hypothesis, participants in the dualism priming condition (41.2%, 7 of 17) were less likely to choose a healthy cookbook than were participants in the physicalism priming condition (75.0%, 12 of 16), χ^2 (1, n = 33) = 3.86, p = .049 (Figure 2).

Study 5: Actual Health Behavior (Meal Choice)

In our final study, we set out to demonstrate the effects of dualism on health behavior in a more controlled laboratory setting. To do so, we had participants undergo a dualism or physicalism priming procedure prior to a meal at the university cafeteria. Ostensibly to investigate memory processes, we asked participants to return to the lab right after eating. Among demographic questions, participants indicated what they had just eaten.

We hypothesized that participants primed with dualism would subsequently pick a less healthy menu in the cafeteria than would participants primed with physicalism. We expected this effect to be evident in subjective health ratings by participants themselves as well as in a coder's health rating of the meals.

Method

Participants and design. Fifty-three university students (21 females; M_{Age} = 24.60, *SD* = 2.86) were approached in the university's cafeteria and asked to participate in a study on memory processes. Participants were randomly assigned to either a dualism or a physicalism priming condition.

Materials and procedure. Participants were recruited prior to lunch. First, they were asked to complete the priming procedure in a lab adjacent to the food counter. We used a modified version of the vignette priming from Studies 1 and 4. Specifically, the concepts of dualism and physicalism were briefly explained and defined, and participants were then asked to relate these concepts to their own lives. Participants were asked to list their thoughts on how they would explain dualism (physicalism) in their own words, and how this concept is evident in their daily lives.

Participants then completed the memory task. They were presented with a simple geometrical formation and asked to memorize this figure. To complete this memory task, participants were asked to return to the lab right after lunch.

During the second session, participants first identified the figure they were previously asked to memorize. All participants correctly identified the figure among five similar distractors. Among other demographic questions, participants were then asked to describe in writing what they had eaten for lunch. Furthermore, they were asked to evaluate their meals on two health-related dimensions using scales from 1 (*not healthy/balanced at all*) to 9 (*very healthy/balanced*), and to estimate the total number of calories their meal contained (reverse-coded). All three items were *z*-transformed and collapsed to form an overall subjective health-index (α = .67). In addition, participants' descriptions of their meals were rated by a coder blind to hypotheses and condition on a scale from 1 (*very unhealthy*) to 9 (*very healthy*). A

randomly selected subsample (50.94 %) of descriptions was rated by a second coder to ensure reliability of codings (Krippendorff's Alpha = .73).

Results and Discussion

Consistent with our predictions, participants in the dualism priming condition (M = -0.23, SD = 0.80) evaluated their meals to be less healthy than did participants in the physicalism priming condition (M = 0.25, SD = 0.65), $t(51) = -2.37$, $p = .022$, $d = -.66$. Likewise, the coder rated the meals of participants in the dualism priming condition (M = 4.43, SD = 1.85) to be less healthy compared to the meals of participants in the physicalism priming condition (M = 5.52, SD = 2.02), $t(51) = -2.05$, $p = .046$, $d = -.56$ (Figure 3). Participants' ratings and ratings by the coder were positively correlated, $r(53) = .44$, $p = .001$, $r^2 = .19$, indicating that first- and third-person ratings converged in their assessment of the meals' healthiness.

General Discussion

Beliefs in mind-body dualism are a cross-culturally observable phenomenon that emerge from some of the most basic processes in human cognition and fundamentally affect the way we perceive ourselves and others. The present research investigated the relationship between these beliefs and various manifestations of health behavior.

Five studies converge in demonstrating that mind-body dualism has a considerable impact on people's health-related attitudes and behaviors. Manipulating dualism in four studies (1, 2, 4, and 5) with three different priming procedures, we provided consistent evidence for the notion that dualistic beliefs decrease the likelihood of engaging in healthy behavior. This was true for German, U.S., student, non-student, online, and lab samples. Furthermore, we demonstrated that the link between dualism and health behavior is bidirectional, i.e., participants' metaphysical beliefs that mind and body are two distinct entities can be amplified by confronting them with health-constraining concepts. This

suggests the intriguing possibility that metaphysical beliefs such as beliefs in mind-body dualism can also serve as cognitive tools for coping, hence lending further support to the flexibility and adaptability of cognitive processes.

If we assume that people are "natural born dualists" (Bloom, 2004), in that each of us is endowed with the cognitive prerequisites facilitating the formation of such a belief, we can also assume that all humans share this belief in dualism to some extent and only vary in magnitude. Thus, the term *physicalism* merely describes the absence of this belief on a unidimensional continuum. Consequently, our results might also be interpreted in terms of decreased beliefs in dualism leading to an increase in healthy behavior.

Our findings indicate that reducing dualistic beliefs using simple priming procedures has immediate consequences for health-related attitudes and behavior. As shown, participants spontaneously chose, bought, and consumed a healthier meal after engaging in a short writing task. This is especially remarkable, as habits (such as food consumption) are considered automatic behaviors that are very limited in their degree of controllability (Aarts & Dijksterhuis, 2000; Bargh, 1994). Thus, our findings promise to have profound implications for real-life problems. In fact, a simple intervention that conveys a more physicalistic perspective to at-risk populations may very well promote healthier – or less self-damaging – behavior patterns.

However, as the present research marks the first time the effects of mind-body dualism on attitudes and behavior are being investigated, much has yet to be determined regarding the processes underlying these effects. In light of the present data, future research efforts should focus on whether the effects of mind-body dualism on health behavior are indeed driven by self-objectification, i.e., by implicitly perceiving one's own body as a tool or object. If this is the case, our findings might similarly explain why professional athletes purposely inject their bodies with performance-enhancing substances, or how religious fundamentalists are capable

of sacrificing their bodies. Furthermore, if dualistic beliefs are not limited to self-perception, but similarly extend to the perception of others, holding such beliefs may affect a host of fundamental social-psychological phenomena such as perspective-taking, aggression, or moral judgments. Given that beliefs in mind-body dualism are present among people across societies, cultures, and eras, the present work emphasizes that it promises to be a research topic worthy of experimental researchers' further attention.

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Figure Captions

Figure 1. Self-reported engagement in health behavior (Study 1) and self-reported attitudes towards health behavior (Study 2) as a function of priming condition. Scores were *z*-transformed. Higher values indicate greater engagement in health behavior and more positive attitudes toward health behavior. Error bars indicate standard errors of the mean.

Figure 2. Likelihood of choosing a healthy vs. an unhealthy cookbook for participants either primed with dualism or physicalism (Study 4).

Figure 3. Participants' ratings and coder's ratings of overall healthiness of meals consumed as a function of priming condition (Study 5). Scores were *z*-transformed. Higher values indicate healthier meals consumed. Error bars indicate standard errors of the mean.