Internal and Social Sources Shape Judgments about the Mental and Physical Nature of

an Experience

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Abstract

Although humans are intuitive dualists, little is known about whether they hold lay beliefs about the *origins or sources* of their intuitive perceptions of what is physical and what is mental. Drawing on theories of the sources of phenomenological experiences, we examined if people hold beliefs about the internal and social origins of judments that their experiences are physical or mental. In Study 1, participants provided physical or mental judgments about a range of personal experiences, and reported relying on both internal (i.e., examining own body and thoughts) and social (i.e., observing others) sources as information for their judgments. To examine the actual reliance on such information, in two additional studies, participants were randomly assigned to receive feedback about whether a target experience was physical or mental in nature, ostensibly from an internal source in Study 2 and a social source in Study 3. Following this feedback, participants recounted a personal instance of the target experience and subsequently judged its physical or mental nature. Participants' judgments were found to align with feedback from both internal and social sources. Overall, these findings demonstrate that people do hold lay beliefs about the internal and social origins of physical and mental perceptions, and information from these sources do shape judgments of their own experiences. Implications for the science of lay theories, as well as the applied domains of clinical and health psychology are discussed.

Keywords: health psychology, judgments, somatic, sources of information

Internal and Social Sources Shape Judgments about the Mental and Physical Nature of an Experience

As intuitive dualists, humans naturally and reliably think about the world by separating the physical and the mental (Bloom, 2005). This intuition and categorization is commonly reflected in religion, such as the concepts of "body" and "soul" (Astutri & Harris, 2008; Atran & Norenzayan, 2004; Bering & Bjorklund, 2004), as well as in clinical contexts, where "physical" or "psychological" disorders are often distinguished (Ahn et al., 2009). Importantly, people's subjective experiences, as well as subsequent attitudes and behaviors, are also shaped by judgments of whether they are physical or mental in nature (e.g., Forstmann et al., 2012; Shariff, Willard, Andersen, & Norenzayan, 2016; Thomas & Wardle, 2014). However, do people hold lay beliefs about where those perceptions come from, and do those sources actually shape their physical and mental judgments of their experiences?

Philosophical and psychological theories have established that phenomenological experiences are fundamentally shaped by internal (e.g., introspective) and social (e.g., normative, cultural) sources of information. However, no empirical work has examined whether the same sources are also believed to shape judgments of experiences as physical or mental in nature. The present research entailed an empirical investigation of whether individuals hold beliefs about the internal and social *origins or sources* of physical and mental judgments, and whether those sources are relied on for making judgments of their subjective experiences.

The Physical and Mental Perceptions of Experiences

The ability and tendency to distinguish the physical and mental aspects of lay experiences is a uniquely human capacity (Povinelli & Bering, 2002; Suddendorf & Whiten, 2001). Such ability and tendency have developmental roots. Based on the developmental trajectory of self-awareness, physical perceptions first begin with the recognition of body

parts and movements in children at six weeks to four months old, and then extend to mental perceptions with meta-cognitive recognition of their own and others' thoughts at about 11 years old (Piaget, 1962, 1973; Rochat, 2003). A similar trajectory have also been discussed in philosophy in the development of consciousness, where the acquisition of early sensory awareness and subsequent expansion to introspective consciousness are considered the fundamental blocks of one's current self-awareness (Brentano, 1874; Hume, 1738; Locke, 1824; Natsoulas, 1983) and self-knowledge (Gertler, 2003; Ryle, 1949) that form intuitive physical and mental perceptions.

The physical and the mental distinction is also commonly used and applied across metaphysical, clinical and basic psychological domains. Beyond taxonomy, these distinctions often shape our subjective experiences, and guide subsequent thoughts and behaviors (Forstmann & Burgmer, 2017). For instance, endorsing the ideas of the "body" and "soul" and their existence in the afterlife is fundamental to believing in the supernatural and acquiring religious beliefs (Astutri & Harris, 2008; Atran & Norenzayan, 2004; Bering & Bjorklund, 2004). In clinical practice, despite the well-established psychosomatic nature of many clinical conditions, disorders are still distinctly classified and diagnosed as "physical" or "psychological" (Ahn et al., 2009). Importantly, this distinction can impact health beliefs, such as whether the cause of an illness was due to one's genes or personality (Helman, 1990; 2007), and subsequently affect treatment decisions, such as seeking treatment from a medical doctor or a psychologist (Furnham & Buck, 2003). Even in basic self-perceptions, similar distinctions have been made, such as whether our ability to self-regulate is a "limited physical resource" or not (Job, Bernecker, Miketta, & Friese, 2015; Job, Dweck, & Walton, 2010). In this area, researchers found in a series of studies that only when people believed that willpower was a limited physical resource, they were then more likely to perform poorly on difficult and mentally depleting tasks (Job et al., 2010).

The above literature highlights that how a psychological state or behavior is subjectively experienced as physical or mental is as important as the objective reality surrounding that experience (Sass & Pienkos, 2013). A large body of empirical work has examined the types of lay beliefs people hold that significantly shape a range of subjective experiences, as well as subsequent attitudes and behaviors, such as essentialist beliefs, implicit theories, and beliefs about the physical and mental nature of experiences (Zedelius, Müller, & Schooler, 2017). However, much less attention has been paid to the origins of these beliefs, particularly where people's subjective physical and mental judgments come from. The current research sought to specifically investigate how people acquire their lay beliefs about their physical and mental subjective experiences. Subjective experiences are often as important as actual, objective experiences in affecting attitudes and behaviors (e.g., Zedelius, Müller, & Schooler, 2017). Especially in the clinical and wellness domains, people's judgments of the physical and the mental as distinct have been shown to increase negative health attitudes and behaviors, such as engaging in more unhealthy eating (Forstmann & Burgmer, 2017; Forstmann et al., 2012). Therefore, in addition to extending the current knowledge about the origins of physical and mental lay judgments, ascertaining these sources will also point to potential ways of shaping subjective physical and mental judgments to increase more adaptive health attitudes and behaviors.

Internal and Social Sources of Physical and Mental Judgments

Imagine the experience of hunger. How do you decide if this experience is a purely bodily response, a purely mental construction, or both? As bodily sensations are often spontaneous, the most intuitive way would be to look to one's bodily reactions (e.g., my stomach is growling) and then inferring that this is a physical experience. Alternatively, if the hunger experience is not accompanied by bodily reactions (e.g., my stomach is not growling), you might then infer that this is a mental experience. Philosophers and psychologists agree

that one basic source of phenomenological self-knowledge is internal, direct self-examination, such as interoception (Cameron, 2001; Sherrington, 1948) and introspection (Boring, 1950; Duval & Wicklund, 1972; Wundt, 1893). This access to internal states and processes is the hallmark of experience and can guide cognition and behavior (Bem, 1972; Damasio, Tranel, & Damasio, 1991; Dunn et al., 2010a; Werner et al., 2013). Therefore, the idea that physical and mental judgments stem from direct internal sources is relatively noncontroversial.

Less obvious is the possibility that *other people* could also influence one's perceptions of an event as physical or mental. The role of information from others, or social sources, in shaping phenomenological experiences is reflected as early as in childhood. One prominent theory of early cognitive development asserts that although children at their early developmental stages are only aware of their *own* experiences and knowledge representations (Piaget, 1957), further down the developmental stages, they begin to pay attention to and be influenced by their external world and other people (Piaget, 1973). For instance, they begin to reconstruct and update self-representations through social information acquired through observational learning and social interactions (Ashford, Davids, & Bennett, 2007; Bandura, 1977; Fryling, Johnston, & Hayes, 2011), as well as direct feedback from parents or caregivers (Gunderson et al., 2013; Zentall & Morris, 2010). Returning to the experience of hunger: Parents could convey to children that hunger is a physical experience when they tell them that their hunger is a sign that they need to replenish energy. Conversely, they could also convey that hunger is mental when they tell children their hunger is just a sign of lacking self-control. Similar influences of social feedback could be observed in adolescents and adults as well, with similar information about the physical or mental nature of hunger conveyed to them through peers or news that they read about.

The above evidence and reasoning suggests that internal and social sources of information are likely to shape physical and mental judgments. However, there has been no empirical demonstration of whether people hold beliefs that their physical and mental perceptions are derived from these sources. We are also not aware of any prior research systematically examining whether internal and social information sources influence judgments of the physical or mental nature of an experience. Therefore, the current research sought to investigate two basic questions: First, do people hold beliefs about internal or social origins of their subjective physical or mental judgments? Second, do people actually use these internal or social sources to make subjective physical or mental judgements of their own experiences?

To address these questions, we conducted three studies that examined the relationship between the physical and mental nature of subjective experiences and their potential sources. In Study 1, we asked participants to describe a range of common experiences (e.g., physical states, psychological states, behaviors), and then rate in terms of how mental versus physical the experiences were. Critically, to assess the perceived sources of those judgments, we asked them to rate how much their knowledge was derived from internal or social sources of information. We hypothesized that participants would report relying significantly on both sources of information in making their judgments. To determine people's reliance on internal and social sources to inform their own subjective experiences in more subtle ways, in subsequent studies, we manipulated information about the physical or mental nature of a target experience, ostensibly derived internally from participants' own judgments (Study 2), and socially from other participants' collective judgments (Study 3). Then, we asked participants to recall a personal instance of the target experience and make judgments about the physical and mental nature of their recalled personal experience. In both studies, we hypothesized that participants' judgments would align with the information provided by the

internal and social sources. All data for the following studies are available on the Open Science Framework (https://osf.io/ucvm6/).

Study 1: Beliefs About the Origins of Mental and Physical Perceptions

The goal of Study 1 was to examine if people hold lay beliefs that their physical and mental experiences are derived from internal and social sources. To achieve this goal, participants judged 18 different experiences (e.g., pushing an object, hunger, general movement, solving a math problem, and physical warmth) as being physical or mental and then reported whether those judgments were based on internal or social information.

Method

Participants

All experiments were approved by the University of Illinois's Institutional Review Board. One hundred and twenty-three participants (60 females, 63 males) from Amazon Mechanical Turk participated in the study. The mean age was 33.59 ($SD = 10.56$; range = 19 – 66). In terms of ethnicity, 65.9% identified as "Caucasian", 20.3% identified as "Asian or Pacific Islander", 7.3% identified as "Hispanic", 2.4% identified as "Black", while the remaining 4.1% identified as "Other". Their median reported annual household income was USD$25,000 to $34,999. Participants were compensated USD$1.00 for about 15 minutes of their time. To ensure that participants were actual human participants and that they paid attention throughout the study, an item that served as validity and attention check was administered twice—once near the beginning after providing the general instructions about the study, and the other towards the end just before measures of individual differences and demographics. The item asked that participants select only the option "Others" as the answer, among 21 possible options. All participants passed the check item at both times it was administered.

Procedure

The study was completed as an online survey. Participants were told that the study concerned linguistic features of texts in relation to personality traits, which required examining writing samples from participants. Participants were presented with 18 common experiences to write about, which comprised six that were more physical in nature (i.e., *pushing an object, general movement, lying down flat, stopping a moving object, physical warmth, sleep*), six that were more mental in nature (i.e., *mental relaxation, solving a math problem, planning the future, quietening the mind, putting together a jigsaw puzzle, general thinking*), and another six that were more ambiguous (i.e., *hunger, love, excitement, anger, pain, tuning out*). They were presented with one experience at a time. Each time, they were asked to recall and summarize in writing, a personal instance in which they enacted that specific experience. After writing about the specific instance, participants were then asked to judge its nature (i.e., mental versus physical), and how they arrived at those judgments (i.e., internal versus social). This procedure of writing followed by rating was repeated 18 times across the different experiences. Demographic questions and debriefing occurred at the end of the study.

Measures

Judgments of experience. Two items assessed participants' ratings of the relative mental or physical nature of each experience on an 11-point bipolar scales from *physical* to *psychological* (-5 = *physical*, +5 = *psychological*) and from *bodily* to *mental* (-5 = *bodily*, +5 = *mental*). As the scales were reliable across all experiences, we averaged them to create an index of with positive scores indicating that the experience was more mental than physical. The means, standard deviations and internal consistencies of the ratings for each behavior or state are presented in Table 1.

Sources of judgments. Participants reported the extent to which they agreed that their judgments about each behavior or state were based on internal and social sources, on a 5-point scale (1 = *strongly disagree*, 2 = *disagree*, 3 = *neutral or don't know*, 4 = *agree*, 5 = *strongly agree*). Two items assessed internal sources: *I learned about it by observing my body* and *I learned about it by keeping track of my thoughts* ($M = 3.71$, $SD = 0.57$, $\alpha = .85$). Three items assessed social sources: *I learned about this by observing other people*, *I learned about this by reading about or being told about similar experiences of other people* and *I already know because I learned about this as a child* ($M = 2.77$, $SD = 0.79$, $\alpha = .92$).

Results and Discussion

First, we examined participants' descriptions of their experiences in terms of physical and mental qualities. We were first interested in knowing if experiences were judged as predominantly physical or mental, which would also signal that our sample of experiences was adequate. Thus, we used a one-sample *t*-test to test each mean against the value of zero on the two types of judgments for each of the 18 experiences. A mean that is significantly less than 0 would indicate that the experience is judged as more physical than mental and a mean that is significantly greater than zero would indicate that the experience is judged as more mental than physical. Table 1 summarizes the descriptive statistics and one-sample *t*-tests for each experience. Overall, all experiences were judged as either significantly more physical or significantly more mental, suggesting that experiences were meaningfully described by these mental or physical dimensions.

To examine our main hypothesis about how much participants relied on internal and social sources of information in judging their experiences, we ran a one-sample *t*-test for the source of judgment ratings for each of the 18 experiences, by testing the ratings against the value of two, which indicates disagreement with the statement. As shown in the right panel of Table 1, the ratings of all experiences were significantly above the disagreement point for

both individual and social sources. These analyses indicate that both internal and social

sources of information were relevant to judgments of the relative properties of experiences.

To test participants' overall reliance on both internal and social sources, we ran the same *t*-

test by testing the average of internal and social source ratings across all 18 experiences

against the value two. Consistent with the above findings, this analysis revealed that overall,

participants relied on both internal sources ($M = 3.71$, $SD = 0.57$), $t(122) = 33.33$, $p < .001$,

and social sources of information ($M = 2.77$, $SD = 0.79$), $t(122) = 10.77$, $p < .001$. In

subsequent studies, however, we went beyond self-report to assess actual reliance, by directly

testing if presenting individual and social informational sources about the nature of

experiences would affect their own judgments.

Study 2: Effect of Internal Origins on Physical and Mental Judgments

This study sought to establish if people actually rely on internal sources of

information to make physical and mental judgments of their own experience, as suggested by

Study 1 results. To this end, we experimentally manipulated the information about the

physical or mental nature of an experience using a bogus feedback paradigm, ostensibly

based on their intuitive introspective knowledge—an internal source—and then assessed its

influence on later judgments of a personal instance of the target experience of *Preparing for

a day*.

Method

Participants

One hundred and fifty-two participants (75 females, 76 males, 1 unreported) from

Amazon Mechanical Turk took part in the study. The mean age was 35.59 ($SD = 11.25$, range

$= 20 – 70$). In terms of ethnicity, 84.9% identified as "Caucasian", 5.3% identified as "Asian

or Pacific Islander", 4.6% identified as "Hispanic", 3.9% identified as "Black", while the

remaining 1.4% identified as "Other". Their median reported annual household income was

USD\$35,000 to \$49,999, which was slightly higher than in Study 1. Participants were compensated USD\$1.00 for about 15 minutes of their time. The same item was used as participant validity and attention check as in Study 1, and was also administered twice—once near the beginning after providing the general instructions about the study, and the other towards the end just before measures of individual differences and demographics. All participants passed the check item at both times it was administered.

Procedure

The study involved a one-way between-subjects design, where the nature of the target experience (condition: mental vs. physical) of *Preparing for a day* was manipulated via a pre-programmed computerized feedback. Participants were told that the researchers were testing a new program to assess unconscious reactions to subliminally presented statements about judgments of common experiences. They were presented with flashes of statements about the nature of six common experiences and they had to respond "Yes" or "No" with a key press based on whether they intuitively agreed with the statement, which represents their unconscious judgment about that experience. After judging all of the statements, participants were provided feedback on their responses. They were then told that they would be randomly assigned to recall and judge an instance of one of the six experiences that they judged, but in actual fact, they were all assigned to the experience of *Preparing for a day.* Next, they recalled an instance in which they were *Preparing for a day* and provided a label for their recalled instance. Then, they rated how mental and physical their recalled experience was. Given the novelty of this procedure, we also asked participants about the clarity, reliability, and validity of the feedback procedure. Finally, they were debriefed about the study. The full detailed procedure can be found in the Supplemental Material.

Manipulation of the nature of experience. To manipulate judgments of the target experience *Preparing for a day*, we used a feedback paradigm that was adapted from past

research that manipulated information about past behaviors by providing feedback of their responses (Albarracin & Wyer, 2000). Participants were told that in this new computerized procedure, they would be exposed to statements, one at a time, describing six experiences (i.e., *playing chess, pushing an object, preparing for a day, reminiscing, taking a walk,* and *hiking*). They were also told that as each experience could be described on two dimensions (e.g., *Anger is mental* or *Anger is physical*), a total of 12 statements would be presented, with each statement appearing in a flash. After each time the statement was flashed, participants would be asked to select the *Yes* or *No* response, by pressing one of two keys, based on their intuitions of whether they agreed with the statement. Nonetheless, in reality, they were presented with 12 of the same statement "*This is a subliminal stimuli*", which appeared at the center of the screen for 30ms, followed by a 50ms mask. In other words, participants never made any actual explicit judgments about the six experiences. This procedure was used to elicit the belief that they were making "unconscious" and intuitive judgments, in line with the cover story that the computerized program assessed unconscious reactions to subliminally presented statements about their judgments of common experiences.

After all statements were presented, participants were shown a system-generated summary table that provided feedback on their ostensible responses to the six experiences as mental or physical. Participants who were randomly assigned to the mental condition saw that their intuitive response to the target experience of *Preparing for a day* was mental, whereas those assigned to the physical feedback condition saw the same table except that their intuitive response to the same target experience was physical. In both conditions, their intuitive responses to the other experiences were exactly the same: *Playing chess* and *Reminiscing* was always mental, and the responses to *Pushing*, *Taking a walk* and *Hiking* were always physical.

Manipulation check. To ensure that participants attended to the feedback, towards the end of the study, we tested their memory for the initial feedback information that was provided to them. In particular, we were interested in their memory for the information on *Preparing for a day*. We asked them to respond to the statement: *The feedback indicated that 'Preparing for a day' was viewed as _____.* Participants responded by choosing from the options *mental* or *physical*.

Judgments of experience. Participants assessed whether their recalled experience of *Preparing for a day* was physical in nature by rating their experience on two 11-point unipolar items—*physical* and *bodily* (-5 = *Not at all*, 5 = *Extremely*; α = .87). Given the high reliability, both items were averaged to form a single physical-judgment index, with higher scores indicating higher judged physical nature of the recalled experience ($M = 6.80$, $SD = 2.55$). Participants also assessed whether their recalled experience of *Preparing for a day* was mental in nature by rating their experience on two 11-point unipolar items—*mental* and *psychological* (-5 = *Not at all*, = *Extremely*, α = .91). Once again, as both items were highly reliable, they were averaged to form a single mental-judgment index, with higher scores indicating higher judged mental nature of the recalled experience ($M = 7.80$, $SD = 2.49$). We also used a bipolar item to assess the relative physical or mental nature of the experience on a 5-point scale (1 = *Totally mental*, 5 = *Totally physical*; $M = 2.89$, $SD = .91$).

Perceptions of the procedure. We had extensive measures of the perceived validity of the experimental procedures. There were no differences among experimental conditions and the feedback appear plausible to participants. These data for both Study 2 and Study 3 are presented in detail in the online supplement.

Results and Discussion

Manipulation checks. We examined the percentage of correct responses to the check question on whether the feedback stated *Preparing for a day* as mental or physical for each

condition. In the mental condition, 76% of the participants correctly identified that the feedback rated *preparing for a day* as appearing as mental. In the physical condition, 68% of the participants correctly identified that the feedback indicated *Preparing for a day* as physical. This suggests that our manipulation of feedback was successful.

   Judgments of experience. To examine if the feedback influenced their judgments of their recalled experience of *Preparing for a day*, we conducted an independent samples *t*-test that compared the mental and physical feedback conditions on the physical-judgment index, mental-judgment index, and the bipolar index of relative mental vs. physical judgment. The analysis yielded a significant effect of feedback on all three indices. Specifically, participants in the physical feedback condition ($M = 7.72$, $SD = 2.32$) rated their recalled experience of *Preparing for a day* as more physical than did participants in the mental feedback condition ($M = 5.86$, $SD = 2.43$), $t(150) = 4.81$, $p < .001$. Correspondingly, participants in the mental feedback condition ($M = 8.31$, $SD = 2.16$) rated their recalled experience as more mental than participants in the physical feedback condition ($M = 7.28$, $SD = 2.69$), $t(150) = -2.59$, $p = .01$. Furthermore, on the bipolar item, participants in the physical feedback condition ($M = 3.07$, $SD = 0.93$) rated their recalled experience as relatively more physical than mental compared to participants in the mental feedback condition ($M = 2.71$, $SD = 0.86$), $t(150) = 2.45$, $p = .016$. Thus, we obtained experimental evidence of the influence of internal sources and then conducted Study 3 to experimentally gauge the influence of social sources.

Study 3: Effect of Social Origins on Physical and Mental Judgments

   The goal of Study 3 was to examine if people also indeed rely on social sources of information, specifically normative beliefs, to inform physical and mental judgments of their own experiences. To this end, we manipulated information about the nature of participants' experience using the same feedback paradigm used in Study 2, except that the information provided was ostensibly based on *other* participants' responses. In addition, to test the

validity of the feedback paradigm across other experiences, participants in this study were asked to recall and evaluate the experience of *Starting an exercise routine*.

Method

Participants

One hundred and sixty-one participants (70 females, 83 males, 8 unreported) from Amazon Mechanical Turk took part in the study. The mean age was 35.12 ($SD = 11.33$, range = 19 – 66). In terms of ethnicity, 71.4% identified as "Caucasian", 8.7% identified as "Hispanic", 6.2% identified as "Black", 5.6% identified as "Asian or Pacific Islander", while the remaining 3.3% identified as "Other". Their median reported annual household income was USD$35,000 to $49,999, which was similar to Study 2. Participants were compensated USD$1.00 for about 15 minutes of their time. As in Study 1 and 2, the same participant validity and attention check item was administered twice—once near the beginning after providing the general instructions about the study, and the other towards the end just before measures of individual differences and demographics. All participants passed the check item at both times it was administered.

Procedure

The study was also one-way between-subjects design, where the nature of the target experience (condition: mental vs. physical) of *Starting an exercise routine* was manipulated. The procedure used to manipulate the information was similar to Study 2, i.e., using pre-programmed computerized feedback, except that at the point of feedback, participants were presented with a system-generated summary of the most common participants' intuitive responses to the six experiences as mental or physical, instead of their own intuitive responses. After the feedback, participants were told that they would be randomly assigned to recall and judge an instance of one of the six experiences, but in actuality, all of them were assigned to the experience of *Starting an exercise routine*. Next, they recalled a personal

instance in which they were *Starting an exercise routine* and provide a label for their recalled experience. After which, they rated how mental and physical their recalled experience was. Finally, they answered some questions about the procedure and were debriefed about the study at the very end. The full detailed procedure can be found in the Supplemental Material.

Measures

Manipulation of judgments based on normative responses by others. The manipulation procedure was exactly the same as in Study 2, except that after all 12 subliminal statements were presented, participants were shown a system generated feedback of the most common participants' responses. Participants who were randomly assigned to the mental condition saw that the most common participants' response to the target experience of *Starting an exercise routine* was mental, whereas those assigned to the physical feedback condition saw the same table except that the most common participants' response to the same target experience was physical. Once again, in both conditions, the feedback on the most common participant responses to the other experiences were exactly the same: *Playing chess* and *Reminiscing* was always mental, and the responses to *Pushing*, *Taking a walk* and *Hiking* were always physical.

Manipulation check. As in Study 2, to ensure that participants attended to the feedback, we asked them to respond to the statement: *The feedback indicated that 'Starting an exercise routine was viewed as _____.* Participants responded by choosing from the options *physical* or *mental*.

Judgments of the experience. Similar to Study 2, participants assessed whether their recalled experience of *Starting an exercise routine* was physical in nature by rating their experience on two 11-point unipolar items—*physical* and *bodily* (-5 = *Not at all*, 0 = *Moderately*, 5 = *Extremely*; α = .91). Given the high internal consistency, both items were averaged to form a single physical-judgment index, with higher scores indicating higher

judged physical nature of the recalled experience ($M = 8.39$, $SD = 2.45$). Participants also assessed whether their recalled experience of starting an exercise routine was mental in nature by rating their experience on two 11-point unipolar items—*mental* and *psychological* (-5 = *Not at all*, 0 = *Moderately*, 5 = *Extremely*, α = .94). Once again, as both items were highly reliable, they were averaged to form a single mental-judgment index, with higher scores indicating higher judged mental nature of the recalled experience ($M = 8.04$, $SD = 2.30$). A bipolar item to assess the relative physical or mental nature of the experience on a 5-point scale was also included (1 = *Totally mental*, 5 = *Totally physical*; $M = 3.14$, $SD = 0.94$).

Results

Manipulation check. Once again, we examined the percentage of correct responses to the check question on whether the feedback stated *Starting an exercise routine* was mental or physical for each condition. In the mental condition, 78% of the participants correctly identified that the feedback indicated *Starting an exercise routine* as mental. In the physical condition, 90% of the participants correctly identified that the feedback indicated *Starting an exercise routine* as physical[1]. Again, this suggests that our manipulation of feedback was successful.

Judgments of the experience. To examine if the manipulated feedback based on the most common participants' responses influenced their own perceptions of their recalled experience of *Starting an exercise routine,* we conducted an independent samples *t*-test that compared the feedback conditions on the physical-judgment index, mental-judgment index, and the bipolar index of relative mental vs. physical judgment. Similar to Study 3, this analysis yielded a significant effect of feedback on all three indices. Specifically, participants

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[1] At first glance, the apparent higher accuracy of recall in the physical condition than the mental condition may indicate that participants are simply relying on their default knowledge that exercise is physical, as opposed to correctly recalling the feedback. However, if participants were indeed relying on their default knowledge, we should expect to see a very high percentage of incorrect recall in the mental condition, which was not the case.

in the physical feedback condition ($M = 9.04$, $SD = 1.96$) rated their recalled experience of

Starting an exercise routine as more physical than participants in the mental feedback

condition ($M = 7.76$, $SD = 2.71$), $t(159) = 3.41$, $p = .001$. Correspondingly, participants in the

mental feedback condition ($M = 8.75$, $SD = 2.08$) rated their recalled experience as more

mental than did participants in the physical feedback condition ($M = 7.30$, $SD = 2.30$), $t(159)$

$= -4.19$, $p < .001$. Furthermore, on the bipolar item, participants in the physical feedback

condition ($M = 3.49$, $SD = 0.83$) rated their recalled experience as relatively more physical

than mental than did participants in the mental feedback condition ($M = 2.79$, $SD = 0.91$),

$t(159) = 5.09$, $p < .001$. Thus, these results supported our hypothesis that normative social

feedback may guide judgments of experiences as physical or mental.

General Discussion

In three studies, we provided empirical evidence that individuals' judgments of the

physical and the mental can stem from both internal and social sources of information.

Overall, we ascertained that in judging the nature of one's personal experiences, people make

those judgments on the basis of internal and social cues. This pattern was observed regardless

of whether individuals were directly asked about the sources they relied on (Study 1), or

whether individuals were experimentally exposed to information that were ostensibly derived

from the self (Study 2) or from others (Study 3). The current investigation provides the first

empirical and causal demonstration of how beliefs about origins of mental-physical affect

subsequent judgments of experience.

To the best of our knowledge, the current investigation is the first to experimentally

explicate the sources of these critical judgments. Findings from this investigation align with

theories that propose the relevance of individual and social sources of general knowledge

about the self, observed in children's developmental trajectory (Bandura, 1977; Fischer,

1980; Oostenbroek et al., 2016; Piaget, 1957; Powell & Spelke, 2018; Vygotsky, 1962), as

well as in shaping higher level self-knowledge such as attitudes (Bem, 1972, De Tezanos-Pinto, Bratt, & Brown, 2010; Lewis, Litt, & Neighbors, 2015) and social influence (Cialdini, 2001; Deutsch & Gerard, 1955; Duong & Bradshaw, 2017; Kelman, 1958; Milgram, 1963; Sussman & Giffort, 2013).

      Understanding subjective perceptions and experiences is central to the study of lay theories (Zedelius, Müller, & Schooler, 2017). Although there is a large body of empirical work about the types of lay theories people hold and how they shape a range of attitudes and behaviors, (Zedelius, Müller, & Schooler, 2017), there has been a limited understanding of the origins of lay beliefs about the physical or mental nature of experiences specifically. Demonstrating that people hold beliefs that their mental and physical distinctions have internal and social origins is a novel extension of the current understanding of lay beliefs about physical and mental subjective experiences. In particular, the finding that mental and physical judgments have social origins align with the works of other lay theories, such has essentialist beliefs (Haslam, 2017), lay beliefs about self-control (Job & Walton, 2017), and lay theories of change (Wilson & English, 2017), that have suggested cultural origins of those lay beliefs. One area of follow-up work might be to examine if social sources with an added cultural dimension shape mental and physical judgments. For instance, might social information from collectivists, who are associated with engaging in more dialectical thinking (Peng & Nisbett, 2000), be more likely shape judgments of experiences as equally physical and mental, compared to social information from individualists? Understanding the different aspects of social influence would point to additional nuances in how social sources shape physical and mental judgments, and how they may also be used to change those judgments.

      The beliefs people form about their bodies and thoughts have consequences for their beliefs about health. In fact, models such as the common sense model (Leventhal, Meyer, & Nerenz, 1980) and the self-regulation model (Leventhal, Nerenz, & Steele, 1984) posit that

people form lay theories about mental and physical disorders. These lay theories include details about the etiology, severity, controllability, and cures of particular diseases (Beadle et al., 2004; Brown et al., 2001; Leventhal et al., 1980; Moss-Morris & Chalder, 2003; Wilson et al., 2002). For example, most people view cancer as having a physical etiology and as being both serious and unpredictable (Godoy-Izquierdo, Lopez-Chicheri, Lopez-Torrecillas, Velez, & Godoy, 2007). Correspondingly, people generally view depression as having a mental etiology and as being both serious and controllable (Godoy-Izquierdo et al., 2007).

However, the experience of hunger, for example, may be interpreted as physical or mental, and the ability to shift these judgments is important from a health perspective. People who are obese appear to over-respond to internal bodily cues, such as emotions (Arnow, Kenardy, & Agras, 1994; Liu et al., 2017). However, using internal cues may still result in better restraint in the long-term than may overreliance on external cues (Fay, White, Finlayson, & King, 2015). In this case, social influence (Asch, 1951; Cialdini, 2001; Cialdini, Wosinska, Barett, & Gornik-Durose, 1999; Milgram, 1961; Rizzato et al., 2016; Sussman & Gifford, 2013) may hold promise for practitioners who wish to redirect those judgments by deploying social resources or using psychological interventions (Torres et al., 2020).

Social information and feedback could come in different forms—from close family and friends, from general normative information, or from normative information of similar others, to name a few. One interesting future investigation might be to examine if there are specific types of social sources that are more powerful in shaping subjective perceptions. For instance, are people more likely to align with the feedback based on close family and friends (e.g., a doctor providing information about the nature of the medical condition that is also endorsed by the patient's family and friends) than feedback based on normative information from similar others (e.g., a doctor providing information about the nature of the medical condition that is also endorsed by other patients who are similar to them in age, gender, or

background). Understanding whether one type of social feedback is more effective or equally effective compared to another type would provide a more concrete suite of approaches that clinicians can use to shape patients' subjective beliefs about their medical conditions in ways that improve their treatment choice, adherence and outcomes.

The common sense and self-regulation models have three implications. First, if some illnesses are conceptualized as having physical causes and others as having mental causes, these judgments are malleable and variable (Godoy et al., 2007). The actual sources of this variability, however, are currently unclear, and may involve the norms and beliefs of others, exposure to different media, cultural syndromes, and chronic mindsets that direct attention to either mental or physical events. Second, the differences in judgments of illnesses as physical or mental may reflect people's underlying health beliefs, which can be used to direct people to different treatment options (Godoy et al., 2007; Furnham & Telford, 2012; McNally, 2011). For instance, future research could examine people's lay judgments of different illnesses as physical or mental, and whether framing appropriate treatments as addressing physical or mental causes could improve treatment acceptance, adherence, and efficacy. Third, the perception of whether a physical or mental experience is validated by internal or social sources also has implications for clinical and health psychology. In this regard, therapists and caregivers may act as social agents who may validate a patient's internal experiences, while also changing those perceptions in ways that help patients cope with illness.

Some limitations of the present research are worth noting. First, as much as we have attempted to illustrate our effects across a range of experiences, there are still a near-infinite number of experiences that we have yet to examine to ascertain the extent of generalizability of our findings. It is possible that different experiences are more or less susceptible to internal or social influences. Second, although we had participants in Studies 2 and 3 rate a different

target experience to illustrate the validity of our feedback paradigm across different experiences, the findings from both studies that illustrate the effects of different feedback may not be fully comparable. Therefore, these findings should be interpreted in the light of this limitation. Also, in our attempt to demonstrate causality of internal and social influences in our studies, the feedback paradigm we employed, although reasonably tightly controlled and generally believable, may still lack the realism of an everyday experience of internal and social feedback. Conceptually replicating our current findings in a more realistic setting, such as putting participants in an actual experience and having them engage in their own introspection or interoception versus observing others doing the same, would be useful in establishing the generalizability of our obtained effects.

The present research was rather specific (and intentionally so) in examining the influence of internal and social sources on the physical and mental dimensions of an experience, which are relatively low-level characterizations. Nonetheless, another basic question that can be examined in future work is whether internal and social sources of information could also influence other judgments of experiences, such as realism (as just discussed), controllability, and malleability. For instance, are individuals more likely to perceive realism, controllability and malleability of an experience when they are exposed to their own internal or social normative beliefs about these same dimensions, and subsequently influence behavior? In our view, these are interesting and important questions that will extend our investigation and subsequently, understanding of subjective experience.

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Table 1. Summary Statistics of Mental-Physical Ratings. Positive Means Indicate More Mental than Physical (Study 1)

State	Cronbach's α	M	SD	t	Individual Source (test value = 2)			Social Source (test value = 2)		
					M	SD	t	M	SD	t
Pushing an object	.88	-3.30	2.00	-18.29*	3.59	.83	21.21*	2.79	1.07	8.30*
Hunger	.88	-1.99	2.71	-8.15*	3.81	.83	23.98*	2.47	1.09	4.74*
General movement	.74	-3.26	2.01	-18.04*	3.68	.89	20.97*	2.95	1.20	8.76*
Solving a math problem	.86	2.90	2.47	12.98*	3.45	.93	17.36*	2.69	1.07	7.02*
Physical warmth	.86	-2.38	2.44	-10.76*	3.76	.72	26.65*	2.57	1.15	5.43*
Lying down flat	.89	-1.61	2.77	-6.40*	3.79	.83	23.84*	2.69	1.14	6.71*
Planning the future	.83	2.24	2.58	9.59*	3.56	.78	22.08*	3.13	1.10	11.42*
Mental relaxation	.86	2.02	2.54	8.77*	3.94	.74	29.18*	2.62	1.03	6.68*
Pain	.94	-3.17	2.70	-12.94*	3.81	.85	23.58*	2.50	1.11	5.05*
Love	.83	2.34	2.18	11.84*	3.88	.84	24.94*	2.98	1.02	10.57*
Physical relaxation	.87	-1.10	2.66	-4.58*	3.73	.85	22.60*	2.42	1.08	4.35*
Excitement	.82	2.25	2.39	10.35*	3.72	.86	22.31*	2.95	1.02	10.20*
Quieting the mind	.84	2.59	2.21	12.90*	3.92	.81	26.25*	2.83	1.01	9.14*

State	Cronbach's α	M	SD	t	Individual Source (test value = 2)			Social Source (test value = 2)		
					M	SD	t	M	SD	t
Putting together a jigsaw puzzle	.81	1.56	2.60	6.67*	3.34	.90	17.12*	2.88	.98	9.92*
Anger	.88	1.98	2.79	7.28*	3.80	.90	22.24*	2.79	1.13	7.81*
General thinking	.80	3.34	1.93	19.05*	3.77	.77	25.39*	2.85	1.05	8.91*
Tuning out	.86	2.91	2.33	13.81*	3.72	.78	24.31*	2.83	1.05	8.89*
Stopping an object	.78	-1.89	2.63	-7.96*	3.45	.82	19.67*	2.84	1.13	8.29*

*p < .001