



# Interest in and reactions to genetic risk information: The role of implicit theories and self-affirmation



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## ABSTRACT

**Rationale:** Implicit theories reflect core assumptions about whether human attributes are malleable or fixed: *Incremental theorists* believe a characteristic is malleable whereas *entity theorists* believe it is fixed. People with entity theories about health may be less likely to engage in risk-mitigating behavior. Spontaneous self-affirmation (e.g., reflecting on one's values when threatened) may lessen defensiveness and unhealthy behaviors associated with fixed beliefs, and reduce the likelihood of responding to health risk information with fixed beliefs.

**Method:** Across two studies conducted in the US from 2012 to 2015, we investigated how self-affirmation and implicit theories about health and body weight were linked to engagement with genetic risk information. In Study 1, participants in a genome sequencing trial ( $n = 511$ ) completed cross-sectional assessments of implicit theories, self-affirmation, and intentions to learn, share, and use genetic information. In Study 2, overweight women ( $n = 197$ ) were randomized to receive genetic or behavioral explanations for weight; participants completed surveys assessing implicit theories, self-affirmation, self-efficacy, motivation, and intentions.

**Results:** Fixed beliefs about weight were infrequently endorsed across studies (10.8–15.2%). In Study 1, participants with stronger fixed theories were less interested in learning and using genetic risk information about medically actionable disease; these associations were weaker among participants higher in self-affirmation. In Study 2, among participants given behavioral explanations for weight, stronger fixed theories about weight were associated with lower motivation and intentions to eat a healthy diet. Among participants given genetic explanations, being higher in self-affirmation was associated with less fixed beliefs.

**Conclusion:** Stronger health-related fixed theories may decrease the likelihood of benefiting from genetic information, but less so for people who self-affirm.

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## 1. Introduction

### 1.1. Implicit theories

Implicit theories, also called mindsets or lay theories, reflect core assumptions about the malleability of traits and characteristics (Dweck, 2006; Dweck and Leggett, 1988; Molden and Dweck,

2006). People who hold *incremental* or *growth* theories believe characteristics can change; people who hold *entity* or *fixed* theories believe they cannot. A person can endorse growth theories in one domain (e.g., artistic ability) and fixed theories in another (e.g., intelligence; Dweck et al., 1995; Molden and Dweck, 2006). Implicit theories guide how people self-regulate and respond to challenges (Burnette et al., 2013): people with growth theories respond to setbacks less helplessly and exert more effort than those with fixed theories. For example, people with health-related growth mindsets report greater self-efficacy for behavior change, greater intentions to diet, more physical activity (Arciszewski et al., 2012; Lyons et al., 2013), and less avoidant coping (Burnette, 2010). Implicit theories

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can be changed through interventions, thus improving outcomes such as academic grades (Paunesku et al., 2015) or weight control (Burnette and Finkel, 2012).

We explored whether implicit theories influence how people engage with genetic/genomic information about disease. Genetic risk information is increasingly available (Collins and Varmus, 2015), yet translation into population health benefits has lagged (Khouri et al., 2007). Research is needed to examine who is interested in genetic risk information and how people react to causal information about disease. To date, no research has explored whether implicit theories are associated with attitudes and intentions concerning genetic risk information.

Implicit theories may influence how people engage with genetic risk information. Genetic information allows people to proactively cope with potential health threats (Aspinwall et al., 2015; Aspinwall et al., 2013), and people often expect that genetic information will improve health (Biesecker et al., 2014). However, people with fixed theories who believe health cannot change may not perceive benefit in learning genetic risk or changing behavior in response. Conversely, people with growth theories try harder when faced with challenges (e.g., learning of disease risk) and thus may seek genetic risk information and engage in preventive behavior. These hypotheses are consistent with limited prior evidence that people who perceived greater control over preventing or managing disease reported greater intentions to learn genetic risk information (Sweeny et al., 2014).

People might endorse a fixed theory if they ascribe genetic rather than behavioral causal attributions to a characteristic. Perceived genetic or behavioral causal attributions, beliefs about gene by environment interactions (Condit and Shen, 2011), fatalism (Shen et al., 2009), and genetic determinism (Parrott et al., 2004) could be conceptually related to implicit theories and are related to engagement with genetic testing. We expected causal attributions and implicit theories to be related in that people who attribute disease to genetic factors should be higher in entity beliefs—and people who endorse gene by environment interactions should be lower in entity beliefs—but that implicit theories and specific beliefs about genetics would not be redundant. A person could think that health cannot change for reasons other than that health is caused by genetics, and most people do not endorse purely genetic causes or behavioral causes of disease (Nguyen et al., 2014). We examined the association of implicit beliefs with causal attributions and beliefs about gene by environment interactions.

Implicit theories might also influence how people respond to learning that genetics or behavior influences disease risk. One might expect that people who learn about genetic causes would subsequently have lower intentions to change lifestyle behaviors (Senior and Marteau, 2007) and/or would adopt fixed theories about weight. Although some studies have shown genetic information about weight to be demotivating (Dar-Nimrod et al., 2014; Persky et al., 2016a,b), receiving information that genes contribute to obesity does not typically decrease self-efficacy, intentions, or health behaviors (Conradt et al., 2009; Meisel et al., 2015; Persky and Street, 2015; Rief et al., 2007; Sanderson et al., 2010). These mixed results suggest the importance of examining moderators of responses to risk information, such as implicit theories about body weight.

### 1.2. Risk and threatening health information

Learning about one's risk for disease or genetic/behavioral causes of a health problem could be threatening if it confers bad news (i.e., high risk) or implicates the self as responsible for poor health. People may respond defensively to protect their self-integrity (Steele, 1988) such as by avoiding information or

doubting its accuracy. People could also respond defensively by adopting fixed theories, which may either obviate the need to change their behavior (e.g., why diet if weight cannot change?), or provide an explanation that does not implicate the self for failed behavior change attempts (e.g., dieting failed because weight cannot change).

Some evidence supports the idea that fixed theories may promote defensive (i.e., self-protective) attitudes when people feel threatened. For example, people with fixed theories often respond to setbacks and challenges defensively by engaging in strategies to protect the self (e.g., withdrawing effort) because they fear others will notice their weaknesses (Dweck and Leggett, 1988). When people feel threatened, inducing growth beliefs can improve outcomes (Molden and Dweck, 2006). Further, a meta-analysis has shown that implicit theories have a greater influence on some aspects of self-regulation when people feel threatened, such as by failure feedback or setbacks (Burnette et al., 2013). More specifically, under conditions of threat as opposed to no threat, growth theories were more strongly associated with lower likelihood of setting performance goals and higher likelihood of setting learning goals, as well as lower likelihood of using helpless strategies and higher likelihood of using mastery strategies.

### 1.3. Self-affirmation

If fixed theories are associated with and can facilitate defensiveness, then self-affirmation might reduce effects and endorsement of fixed theories. When people are given the opportunity to reflect on core strengths and values ("self-affirmation"), they respond less defensively to self-threats (Epton et al., 2014). People differ in how much they naturally self-affirm when feeling threatened, termed spontaneous self-affirmation (SSA; Cornil and Chandon, 2013; Harris et al., 2017). Individuals higher in SSA may be less defensive in health contexts (Taber et al., 2016). We expected that people with fixed theories would express lower intentions to obtain potentially threatening genetic risk information, but that SSA would attenuate these associations. We also predicted that people who self-affirm will be less likely to defensively adopt fixed beliefs as a defensive strategy upon learning about explanations for obesity.

### 1.4. Current research and hypotheses

Two studies examined the role of health-related implicit theories in multiple aspects of learning and responding to genetic risk information in two disparate studies and samples (Fig. 1). Specifically, we examined how implicit theories are associated with intentions to learn genetic risk information (Study 1), how implicit theories influence responses to receiving information about risk factors for disease (Study 2), and how learning risk information influences endorsement of implicit theories themselves (Study 2). We also examined SSA, heretofore unexplored with respect to implicit theories.

## 2. Study 1

We examined implicit theories about health among people facing potential receipt of actual genetic test results. We hypothesized that greater fixed theories would be associated with less proactive and adaptive responses. Proactive coping involves identifying stressors in advance and acting to reduce their impact (Aspinwall and Taylor, 1997). We examined multiple constructs broadly indicative of proactive and adaptive coping, including anticipated negative affect concerning high risk; intentions to learn risk information for medically actionable disease, nonactionable

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