

Implicit Theories of Interest: Finding Your Passion or Developing It?



Paul A. O’Keefe^{1,2}, Carol S. Dweck³, and Gregory M. Walton³

¹Division of Social Sciences, Yale-NUS College; ²Department of Management and Organisation, NUS Business School, National University of Singapore; and ³Department of Psychology, Stanford University

Psychological Science
 2018, Vol. 29(10) 1653–1664
 © The Author(s) 2018
 Article reuse guidelines:
sagepub.com/journals-permissions
 DOI: 10.1177/0956797618780643
www.psychologicalscience.org/PS



Abstract

People are often told to find their passion, as though passions and interests are preformed and must simply be discovered. This idea, however, has hidden motivational implications. Five studies examined implicit theories of interest—the idea that personal interests are relatively fixed (fixed theory) or developed (growth theory). Whether assessed or experimentally induced, a fixed theory was more likely to dampen interest in areas outside people’s existing interests (Studies 1–3). Individuals endorsing a fixed theory were also more likely to anticipate boundless motivation when passions were found, not anticipating possible difficulties (Study 4). Moreover, when it became difficult to engage in a new interest, interest flagged significantly more for people induced to hold a fixed rather than a growth theory of interest (Study 5). Urging people to find their passion may lead them to put all their eggs in one basket but then to drop that basket when it becomes difficult to carry.

Keywords

motivation, social cognition, interest, passion, implicit self-theories, open data, open materials, preregistered

Received 12/15/15; Revision accepted 5/8/18

In recent years, the injunction to “find your passion” has become increasingly common (<https://trends.google.com/trends/explore?date=all&q=%22find%20your%20passion%22>). But where do interests come from and how do they unfold? Are interests there all along, waiting to be revealed? Or must a spark of interest be cultivated through investment and persistence? This distinction is the crux of implicit theories of interest: whether interests and passions are understood as inherent and relatively fixed or as developed.

We theorize that the belief that interests are inherent, not developed, carries important hidden implications. First, this belief may imply that the number of interests one can have is limited and, thus, that once people have found their interests, there is little reason to explore other areas. Second, the idea that interests are inherent may imply that a strong and deeply internalized interest—a passion—provides constant motivation and inspiration; thus, engaging in the interest should come relatively easily, with minimal difficulty or frustration. On the other hand, if interests are developed, then having a strong interest in one area does not preclude developing interests elsewhere. Moreover, the belief

that interests are developed, not revealed fully formed, implies that this development may sometimes be difficult. If so, a growth theory of interest may help sustain interest in the face of frustration or difficulty.

Consider an analogy with love. People can believe that successful relationships are destined or cultivated (see Knee & Petty, 2013). With the former perspective, people see dating as an attempt to find “the one.” Faced with relationship challenges, people may quickly move on. By contrast, the latter belief can increase people’s motivation to maintain relationships and resolve differences when they arise (Knee, 1988; Knee et al., 2002). Similarly, a fixed theory of interest implies that a core interest awaits discovery. When found, other areas may be ignored. If difficulties arise, these difficulties may be taken as evidence that the interest was not “the one” after all. In this way, the well-meant imperative to “find

Corresponding Author:

Paul A. O’Keefe, Yale-NUS College, Division of Social Sciences, 10 College Ave. West, #01-101, Singapore 138609
 E-mail: paul.okeefe@yale-nus.edu.sg

your passion” may undermine the development of interests.

To test these predictions, we examined how implicit theories of interest, both measured as an individual difference and induced to test their causal effects, influence people's openness to areas outside their core interests (Studies 1 to 3). Study 4 examined how theories of interest influence expectations for how motivation should unfold. For individuals holding a fixed theory, finding a passion should suggest that it will provide unlimited motivation, making its pursuit relatively easy. By contrast, individuals holding a growth theory should expect that pursuing even strong interests will sometimes be difficult. Finally, if a fixed theory is associated with expectations that pursuing a strong interest will be easy, that belief may lead people to discount an interest if it becomes difficult. We tested this hypothesis in Study 5.

The current research drew on previous work on implicit self-theories, which shows that people can hold fixed and growth theories for many different attributes, such as intelligence (see O'Keefe, 2013), personality (Erdley & Dweck, 1993), shyness (Beer, 2002), and willpower (Job, Dweck, & Walton, 2010). Importantly, the belief that change is possible in one domain (e.g., intelligence) does not necessarily mean that a person believes that change is possible in another area (e.g., personality; e.g., Dweck, Chiu, & Hong, 1995; Schroder, Dawood, Yalch, Donnellan, & Moser, 2016). Theories of interest are also theoretically distinct from these other constructs. For example, although theories of intelligence—beliefs about the malleability of intelligence—can predict whether people pursue intellectual challenges, they would not be expected to predict a person's openness to developing new interests in areas outside their existing area of interest. The current work is also distinct from previous work exploring beliefs about vocational passion (Chen, Ellsworth, & Schwarz, 2015), which focuses on vocational fit and deeply internalized passions related to occupations rather than the broader spectrum of interests.

Implicit theories of interest also extend the predominant theory describing how interests develop: the four-phase model (Hidi & Renninger, 2006). That model suggests that interests are sparked externally (e.g., by an exciting lecture) and that, through a process of increased valuation, positive affect, and accrued knowledge, people come to internalize the interest and pursue it as part of their identity. This model, however, does not incorporate people's beliefs about the nature of interests. Instead, it tacitly assumes that all people view interests as developed. Implicit theories of interest may help clarify why some people delve into new, diverse interests and persist in pursuing them, whereas others do not.

Study 1: Openness to New Interests

Do theories of interest predict people's openness to new interests? University students reported their interest in two academic articles: one that was related to their existing interest and another that was not. We expected that students endorsing fixed and growth theories would not differ in their interest in the article within their area of interest but that students endorsing a fixed theory would express less interest in the article outside this area, compared with students endorsing a growth theory.

Method

This study was a preregistered replication (<https://osf.io/dmfqeq/>) of a previous laboratory study that yielded nearly identical results. The prior study was delivered in a manner that gave it higher impact—in a lab setting, not online—but had a smaller sample size (it is summarized in the Supplemental Material available online).

Participants. In the present study and those that follow, we focused on college students because they are typically exploring possible interests and are often implored to find their passion. For our primary hypothesis, we estimated that a sample size of 84 would be required in order to have 80% power to detect a medium-sized effect with four predictors ($\alpha = .05$). Our presumed medium-sized effect was based on the effect obtained in the prior study, which yielded a large effect size yet was conducted in a more controlled setting. Because the current study was conducted online, we expected that the less controlled setting would result in a relatively smaller effect size. We exceeded our target, recruiting 126 university students (73 female students, 53 male students; age: $M = 23.11$ years, $SD = 5.30$) from a paid pool in exchange for a \$6 gift card.

Procedure. Participants were recruited for a study that they were told would involve reading two articles and reporting their opinions about them. First, they completed an online prescreening, which included measures of personality and the degree to which participants self-identified as a “techy” (local vernacular for students interested in technology, math, engineering, and hard sciences) and as a “fuzzy” (local vernacular for students interested in the arts and humanities). As described below, only students who identified as one type and not the other (not both or neither) immediately proceeded to the main study.

In the main portion of the study (also online), after providing informed consent, students completed an assessment of implicit theories of interest and were then told that they would share their thoughts about two

articles: one article related to techy interests and the other to fuzzy interests. Participants first read the article that mismatched their techy or fuzzy identity and then read the article that matched their interest identity. After reading each article, participants reported their level of interest in the topic. Finally, they completed several secondary tasks and questions (see the Supplemental Material), as well as demographic questions, and were then debriefed. The entire session took about 30 min.

Materials. The techy article was published in *Science* (Hornby & Kurtoglu, 2009) and discussed the future of the Internet and the potential for websites to use adaptive evolutionary algorithms rather than to simply respond to user input as they typically do. The fuzzy article was published in *Proceedings of the Modern Language Association* (Klein, 2010) and discussed the future of literary criticism and the influence of Jacques Derrida. Both articles were edited to be roughly similar in length (920 and 1,194 words, respectively) and format, and images were removed from the techy article for consistency. The source of each article was provided.

Measures.

Openness to experience. In the prescreening session, participants completed the Ten-Item Personality Inventory (Gosling, Rentfrow, & Swann, 2003). They were presented with 10 personality characteristics, with two items representing each Big Five personality dimension, and asked to report the extent to which they agreed or disagreed that the item applied to them (1 = *disagree strongly*, 7 = *agree strongly*). We used the two items tapping openness to experience: "I see myself as open to new experiences, complex" and "I see myself as conventional, uncreative" (reverse scored; $M = 5.04$, $SD = 1.16$). Greater openness to experience might predict greater interest in the mismatching article. Including this covariate allowed us to test the effects of theories of interest above and beyond this factor.

Techy- and fuzzy-interest identity. Also in prescreening, amid two filler items, students reported their level of agreement with two statements: "I am a Techy" ($M = 3.70$, $SD = 1.72$) and "I am a Fuzzy" ($M = 3.55$, $SD = 1.54$; 1 = *strongly disagree*, 6 = *strongly agree*). (In the prior laboratory study reported in the Supplemental Material, these measures were completed in an unconnected mass testing session embedded within many other measures 4 to 10 weeks prior to participation in the main study rather than immediately before the beginning of the study.) Students who reported agreement with one statement (rating of 4, 5, or 6) and disagreement with the other statement (rating of 1, 2, or 3) were eligible for the main study. In all, 64 self-identified techies and 62 self-identified fuzzies took part. In addition to aiding our selection procedure,

the degree of participants' self-identification as a techy and as a fuzzy were also used as covariates. These variables controlled for the strength of participants' interest identity in each area, which might also predict their interest in the two articles. This procedure allowed us to test the hypothesis that theories of interest would predict interest in the mismatching article above and beyond the strength of participants' interest identities.

Implicit theories of interest. Students eligible for the current study reported their level of agreement with four statements assessing implicit theories of interest. These statements were adapted from the theory-of-intelligence scale (Dweck, 1999): "To be honest, your core interests will remain your core interests. They won't really change," "No matter how central your interests are to you, they can change substantially," "You can be exposed to new things, but your core interests won't really change," and "Even if you have very strong interests, they can change dramatically" (1 = *strongly disagree*, 6 = *strongly agree*; $\alpha = .77$, $M = 3.68$, $SD = 0.89$). In our prior study (see the Supplemental Material), implicit theories of interest were assessed weeks earlier in an unconnected mass testing session, similar to the procedure used for techy and fuzzy interest identity. That recruitment procedure, and the procedure used in Study 2, prevented the possibility that demand processes could account for our findings.

Interest in article topics. After reading each article, participants' interest in the article topic was assessed using a modified version of the interest scale developed by Linnenbrink-Garcia and colleagues (2010, Study 2). The 11 items included, "Reading this article was exciting," "I'd like to learn more about the topic discussed in the article," and "I could see myself pursuing a career in the field discussed in the article" (1 = *strongly disagree*, 7 = *strongly agree*; techy article: $\alpha = .95$, $M = 4.67$, $SD = 1.43$; fuzzy article: $\alpha = .96$, $M = 3.63$, $SD = 1.54$).

Results

A repeated measures analysis of covariance yielded the predicted interaction between theories of interest and article type, $F(1, 123) = 5.32$, $p = .023$, $\eta_p^2 = .04$. The more participants endorsed a fixed theory, the less interest they expressed in the article that mismatched their interest identity, $\beta = 0.22$, $t(123) = 2.50$, $p = .014$. As expected, however, theories of interest did not predict interest in the identity-matching article, $\beta = -0.04$, $t(123) = -0.46$, $p = .647$.

This interaction held, $F(1, 120) = 6.70$, $p = .011$, $\eta_p^2 = .05$ (see Fig. 1), controlling for the main effects of techy-identity strength, $F(1, 120) = 12.34$, $p = .001$, $\eta_p^2 = .09$; fuzzy-identity strength, $F(1, 120) = 10.08$, $p = .002$, $\eta_p^2 = .09$; and openness to experience, $F(1, 120) =$

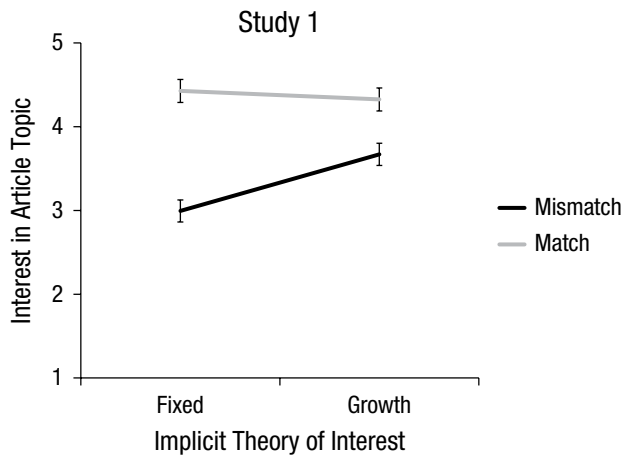


Fig. 1. Students' mean rating of interest in the articles that matched and mismatched their techy- or fuzzy-interest identity as a function of their theory of interest (Study 1). Fixed and growth theories of interest are plotted at 1 standard deviation below and above the mean, respectively. The analysis controlled for techy- and fuzzy-interest identities and openness to experience as well as their interactions with article type. The interest scale ranged from 1 to 7. Error bars represent standard errors.

1.97, $p = .163$, $\eta_p^2 = .02$, and the interactions of each of these with article type—techy-identity strength: $F(1, 120) = 0.68$, $p = .412$, $\eta_p^2 = .006$; fuzzy-identity strength: $F(1, 120) = 0.09$, $p = .766$, $\eta_p^2 = .001$; openness to experience, $F(1, 120) = 22.13$, $p < .001$, $\eta_p^2 = .16$.

As in the model without covariates, the model with covariates revealed that a stronger fixed theory predicted relatively less interest in the mismatching article, $\beta = 0.24$, $t(120) = 2.88$, $p = .005$; however, as expected, implicit theories of interest did not predict interest in the matching topic, $\beta = -0.04$, $t(120) = -0.42$, $p = .678$.

Discussion

The belief that interests are fixed suggests that people simply have some interests and not others. Consistent with this reasoning, the results of Study 1 showed that a stronger fixed theory was associated with less interest in the topic outside participants' preexisting interest.

Study 2: Ruling Out Demand Characteristics and Alternative Explanations

Perhaps responses to the implicit-theories-of-interest scale influenced students' interest responses to the two articles. Although demand processes are unlikely to explain the results of our study described in the Supplemental Material, which assessed interest identity and implicit theories of interest weeks earlier in an

unconnected setting in which the measure was embedded among many others, Study 2 further addressed this possibility by reversing the order of the key tasks. Students first read the articles and rated their interest in each and later completed the implicit-theories-of-interest scale. Furthermore, to rule out the possibility that implicit theories of intelligence explain our results, we assessed this variable to establish that implicit theories of interest are a unique predictor of our outcomes.

Method

This study and its hypotheses were preregistered (<https://osf.io/5fzqp/>) and predicted that the results of Study 1 would be replicated: A stronger fixed theory, compared with a stronger growth theory, would predict less interest in the mismatching article topic and equal interest in the matching article topic.

Participants. One hundred forty-one undergraduates (88 female students, 53 male students; age: $M = 23.24$ years, $SD = 3.09$) were recruited from Mechanical Turk. Although the sample-size plan was identical to that in Study 1, we exceeded that number (without first viewing the data), given uncertainty about how our materials would fare on the online platform (compared with a university campus). Participants were paid \$2 for their participation, which took a median of 11.95 min.

To check whether participants were students, we included an item in the demographics questionnaire that assessed whether they were currently enrolled in an undergraduate degree program. Two participants reported that they were not enrolled and were consequently omitted from all analyses.

Procedure. The study was visible only to Mechanical Turk workers between the ages of 18 and 30 years to limit recruitment to those who were college age. Prospective participants were asked to read two articles and to report their opinions about them. They first completed a prescreening, which assessed their student status and interest identity amid other items to disguise the purpose of the study. Only individuals who reported that they were full-time college students and could be identified as a techy or fuzzy (not both or neither) were eligible. Eligible students immediately advanced to the study.

The procedure was the same as in Study 1, with a few exceptions. Most notably, after the main task in which students read the two articles and rated their interest in each, they completed the personality inventory, the theories-of-interest scale, the implicit-theories-of-intelligence scale, and then general demographics.

By placing the theory-of-interest scale between other measures, we sought to further disguise its purpose. No other measures or tasks were included.

Furthermore, at the beginning of the study, students read,

Today we are pre-testing materials for future research and will be asking your opinions about two articles. Afterward, we will ask you some demographic and general information questions to ensure that we get opinions from a diverse group of people.

The first statement was intended to convey that we did not have particular hypotheses related to their reported opinions about the articles. The second statement was intended to suggest that their responses to the questionnaires, including the theories-of-interest scale, were unconnected to their article ratings. By making these statements, we further reduced the possibility of demand.

Materials. The same articles were used as in Study 1. Again, students reported more interest in the techy article than the fuzzy article, $t(138) = 4.44, p < .001$.

Measures. Interest identity was assessed in the same manner as in Study 1; however, we used different labels because the local vernacular used before (i.e., techy and fuzzy) might not be understood in a general student population. Instead, we asked potential participants to report the extent to which they agreed with two statements: “I am a Science/Technology-oriented person” (techy; $M = 4.02, SD = 1.50$) and “I am an Arts/Humanities-oriented person” (fuzzy; $M = 3.67, SD = 1.50$). Interest in the techy ($M = 4.23, SD = 1.51, \alpha = .96$) and fuzzy ($M = 3.42, SD = 1.51, \alpha = .96$) articles, openness to experience ($M = 5.08, SD = 1.15$), and implicit theories of interest ($M = 3.65, SD = 0.96, \alpha = .85$) were assessed in the same manner as in Study 1.

To test whether implicit theories of interest were unique in predicting interest in the article outside students’ core area, we also assessed implicit theories of intelligence for use as a covariate. The assessment included four items from a validated scale (Dweck, 1999): “You have a certain amount of intelligence, and you can’t really do much to change it,” “Your intelligence is something about you that you can’t change very much,” “To be honest, you can’t really change how intelligent you are,” and “You can learn new things, but you can’t really change your basic intelligence.” The items were reverse scored and a mean composite was calculated, with higher scores reflecting a stronger

growth theory (1 = *strongly disagree*, 6 = *strongly agree*; $M = 4.10, SD = 1.20, \alpha = .95$).

Results

Forty-three undergraduates spent 1 min or less reading each article, suggesting that they did not thoroughly engage with the material. Omitting them from the analyses did not change the results. We retained them, however, to provide a more conservative test of our hypotheses.

A repeated measures analysis of covariance yielded the predicted interaction between theories of interest and article type, $F(1, 137) = 7.46, p = .007, \eta_p^2 = .05$. The more students endorsed a fixed theory, the less interest they expressed in the article that mismatched their interest identity, $\beta = 0.20, t(137) = 2.42, p = .017$. Theories of interest did not predict interest in the identity-matching article, $\beta = -0.08, t(137) = -0.98, p = .328$.

This interaction held, $F(1, 133) = 9.26, p = .003, \eta_p^2 = .07$ (see Fig. 2), controlling for techy-identity strength, $F(1, 133) = 1.44, p = .287, \eta_p^2 = .01$; fuzzy-identity strength, $F(1, 133) = 1.76, p = .186, \eta_p^2 = .01$; openness to experience, $F(1, 133) = 2.71, p = .102, \eta_p^2 = .02$; and implicit theories of intelligence, $F(1, 133) = 0.20, p = .656, \eta_p^2 = .001$; and the interaction of each of these with article type—techy-identity strength: $F(1, 133) = 17.27, p < .001, \eta_p^2 = .12$; fuzzy-identity strength: $F(1, 133) = 1.83, p = .178, \eta_p^2 = .01$; openness to experience: $F(1, 133) = 0.14, p = .713, \eta_p^2 = .001$; implicit theories of intelligence: $F(1, 133) = 0.79, p = .375, \eta_p^2 = .01$.

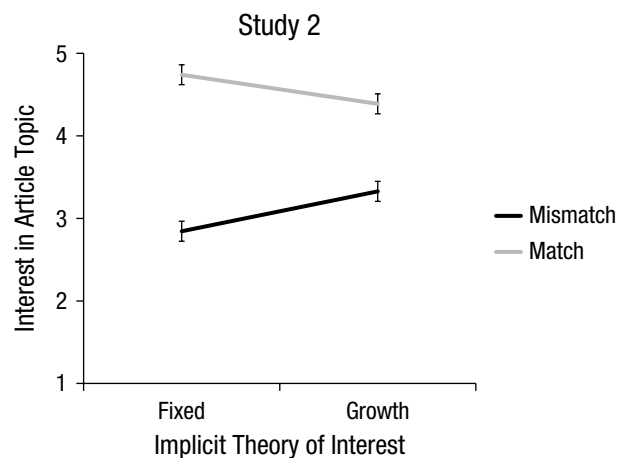


Fig. 2. Students’ mean rating of interest in the articles that matched and mismatched their techy- or fuzzy-interest identity as a function of their theory of interest (Study 2). The analysis controlled for techy- and fuzzy-interest identities, openness to experience, and implicit theories of intelligence, as well as their interactions with article type. Fixed and growth theories of interest are plotted at 1 standard deviation below and above the mean, respectively. The interest scale ranged from 1 to 7. Error bars represent standard errors.

With covariates included, a stronger fixed theory predicted less interest in the mismatching article topic, $\beta = 0.17$, $t(133) = 2.08$, $p = .039$; however, implicit theories of interest did not predict interest in the matching topic, $\beta = -0.13$, $t(133) = -1.52$, $p = .130$.

Discussion

Together, Studies 1 and 2 and the in-lab supplemental study, showed that a fixed theory of interest predicts less interest in an article topic outside students' interest area (but not an article within their interest area), that this effect does not result from demand, and that it does not arise from other factors, such as theories of intelligence.

Study 3: Does a Fixed Theory of Interest Cause Less Openness to New Interests?

Does a fixed theory cause people to limit their interest to topics inside their core area? Study 3 tested whether experimentally inducing theories of interest would produce the same pattern of results observed in Studies 1 and 2.

Method

Participants. For our primary hypothesis, we estimated that a sample size of 76 would be required in order to have 80% power to detect a medium-sized effect with three predictors ($\alpha = .05$). Data were collected until the subject pool closed for the academic term, yielding 89 undergraduates (52 female students, 37 male students; age: $M = 19.96$ years, $SD = 1.67$) who participated in exchange for \$6. Participants completed a prescreening survey embedded in mass testing at the beginning of the term—which was conducted weeks earlier and not linked to our study—and were subsequently recruited if they identified as either a techy or a fuzzy (not both or neither). Recruitment materials stated that they would read a few articles and report their opinions about them. Four participants for whom data were missing on key variables were omitted from all analyses.

Procedure. With a few exceptions, the procedure was similar to that used in Study 1. First, the study was conducted in the lab rather than online. Second, before participants read the techy- and fuzzy-related articles, they read one of two 2-page *Psychology Today*-type articles. For a random half of participants, the article reported that interests are stable and inherent predispositions revealed at some point in one's life and then relatively unchanging (fixed-theory condition). For the other half, the article reported that interests are malleable and develop over

time, cultivated through interaction between a person and the domain (growth-theory condition). Both articles highlighted notable people (e.g., Albert Einstein) to illustrate how interests do not or can change significantly across the life span. After completing the critical tasks, participants completed several additional tasks not central to our main hypotheses (see the Supplemental Material). The entire session lasted about 30 min.

Measures. In a mass testing prescreening session several weeks before the main portion of the study, students completed the measures of techy ($M = 3.69$, $SD = 1.44$) and fuzzy ($M = 3.45$, $SD = 1.38$) identity strength embedded in many other measures. Openness to experience was not assessed because Studies 1 and 2 and the supplemental study found that it did not explain our results, and moreover, Study 3 induced rather than measured theories of interest. Later, in the lab, participants reported their interest in the techy article topic ($M = 3.69$, $SD = 1.64$, $\alpha = .97$) and the fuzzy article topic ($M = 2.42$, $SD = 1.25$, $\alpha = .95$). Afterward, they completed a manipulation check (five items). For example, participants were asked what the research on the historical figures described in the *Psychology Today*-type article showed. Response options included, "It showed that their core interests had changed significantly over their lives" (correct for the growth-theory condition), and "It showed that their core interests had remained the same over their lives" (correct for the fixed-theory condition). We calculated the number of items answered correctly for a maximum of 5 points. Participants performed well in both the fixed-theory condition ($M = 4.22$, $SD = 0.82$) and the growth-theory condition ($M = 4.59$, $SD = 0.79$), although the latter group performed somewhat better, $t(83) = -2.13$, $p = .036$, $d = 0.46$, reflecting the fact that one item in the fixed-theory quiz was relatively difficult (only 50% of participants answered it correctly).

Results

A mixed-model analysis of variance (ANOVA) with matching and mismatching interest ratings as the within-subjects variable and theory-of-interest condition as the between-subjects variable yielded the predicted interaction, $F(1, 83) = 5.92$, $p = .017$, $\eta_p^2 = .07$. Extending Studies 1 and 2, as well as the supplemental study, we found that students in the fixed-theory condition ($M = 2.04$, $SD = 0.81$) reported less interest in the mismatching article topic than those in the growth-theory condition ($M = 2.64$, $SD = 1.38$), $F(1, 83) = 5.44$, $p = .018$, $\eta_p^2 = .07$; however, there was no difference in interest for the matching topic between the fixed-theory condition ($M = 3.96$, $SD = 1.59$) and growth-theory condition ($M = 3.57$, $SD = 1.69$), $F(1, 83) = 1.20$, $p = .276$, $\eta_p^2 = .01$.

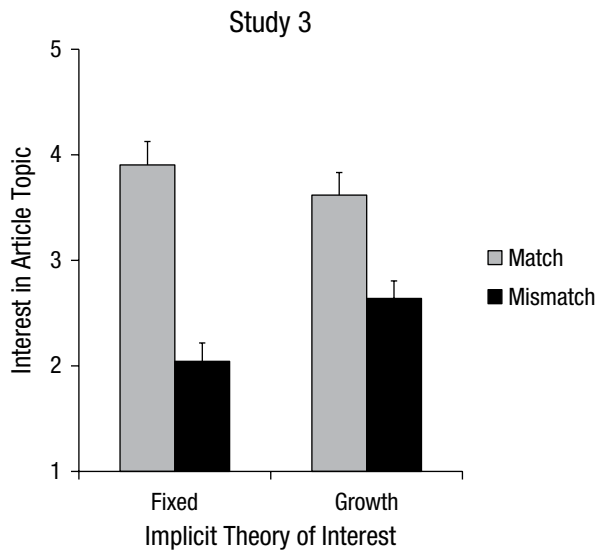


Fig. 3. Students' mean rating of interest in article topics that matched and mismatched their techy- or fuzzy-interest identity, separately for each theory-of-interest condition (Study 3). The analysis controlled for techy- and fuzzy-interest identity strength. The interest scale ranged from 1 to 7. Error bars represent standard errors.

The interaction held, $F(1, 81) = 7.47, p = .008, \eta_p^2 = .08$ (see Fig. 3), controlling for the main effects of techy-identity strength, $F(1, 81) = 3.41, p = .069, \eta_p^2 = .04$, and fuzzy-identity strength, $F(1, 81) = 0.40, p = .529, \eta_p^2 = .005$, and the interaction of each of these factors with article type—techy-identity strength: $F(1, 81) = 13.16, p < .001, \eta_p^2 = .14$; fuzzy-identity strength: $F(1, 81) = 0.33, p = .566, \eta_p^2 = .004$. The interaction between techy-identity strength and interest ratings indicates that the more students held a techy-interest identity, the more interested they were in the matching article relative to the mismatching article. This was also found in Study 2, but not in Study 1, where techies were more interested in the article topics than were fuzzies overall. Regardless, our main hypothesis was confirmed across all three studies.

The students reported less interest in the mismatching article in the fixed-theory condition (adjusted $M = 2.04$, adjusted $SD = 0.81$) than in the growth-theory condition (adjusted $M = 2.64$, adjusted $SD = 1.38$), $F(1, 81) = 6.04, p = .016, \eta_p^2 = .07$. By contrast, there was no condition difference in interest in the matching article (fixed-theory condition: adjusted $M = 3.90$, adjusted $SD = 1.59$; growth-theory condition: adjusted $M = 3.64$, adjusted $SD = 1.69$), $F(1, 81) = 0.84, p = .36, \eta_p^2 = .01$.

Discussion

Implicit theories of interest have a causal effect. As compared with a growth theory, a fixed theory of interest reduces people's interest in a topic outside their established area of interest.

Study 4: Motivational Expectations for Strong Interests

How do theories of interest affect people's expectations about motivation within a core area of interest? If people believe that strong interests (i.e., passions) are inherent and emerge fully formed, they may assume that those interests will come with limitless motivation, making them easy to pursue. If passions are cultivated, however, the developmental process may hold challenges, and people may anticipate that pursuing them may sometimes be difficult.

Method

Participants. This study examined the probability of hypothesized responses in a free-response paradigm. Accordingly, we estimated that a sample size of 51 would be required in order to have 80% power to detect a medium-sized effect on the basis of an odds ratio of 2.33 ($\alpha = .05$). We collected data until the subject pool closed at the end of the term, yielding 47 undergraduates who participated in exchange for partial course credit. Three participants did not complete the tasks and were omitted from all analyses. Forty-four participants remained (24 female students, 20 male students; age: $M = 19.18$ years, $SD = 1.33$). Therefore, we fell short of our estimated sample size; however, Study 5 addressed a similar question using a different methodology and with a larger sample.

Procedure. At the beginning of the term, participants completed the theories-of-interest scale in a mass testing session; no connection was made to the outcome measures they saw weeks later. Participants were told that the purpose of the study was to "investigate ideas about people's deepest interests—their passions," and it was administered entirely online. Given that this was our first investigation of the link between theories of interest and expectations for motivation, we allowed participants to offer their own responses rather than imposing responses on them. Of the several open-ended questions to which participants responded (for the full survey, see the Supplemental Material), the critical ones were, "Once someone has discovered a passion, what happens to their motivation as they pursue that passion? Will they have limitless motivation? Will they stop procrastinating? Please explain" and "Once someone has discovered a passion, what is it like for them to pursue that passion? Please explain."

These questions represented interests from the perspective of a fixed theory (i.e., as "discovered") because our primary interest was in whether participants endorsing more of a fixed theory would also endorse the hypothesized motivational implications of that theory. Nonetheless, participants were free to respond in any way they wished. Finally, participants were debriefed.

Coding. Two trained research assistants, blind to our hypotheses and participants' implicit theory, coded responses to each question. All codes reflected the presence (1) or absence (0) of prespecified content. Question 1 was coded for statements referring to (a) the belief that passions provide people with a source of limitless motivation (e.g., "They will have limitless motivation as long as this remains their passion") and (b) whether a passion causes people to cease procrastination (e.g., "Their motivation for the passion definitely increases. Since they actually want to do it, there is no procrastination"). We distinguished between limitless motivation and procrastination to provide a more nuanced measure of the motivational consequences that people might anticipate for a new passion. Although we viewed the constructs as related, we also viewed them as distinct. Even if one believes that passion provides limitless motivation, one could still put off engaging in it until, for example, one feels particularly inspired or that the time is right. Question 2 was coded for whether participants suggested that passions can sometimes be difficult to pursue (e.g., "I think that pursuing a passion is never simply easy and fun. It is challenging and that is what makes the pursuit rewarding"). Interrater reliability was strong for all categories (κ s = .91, .85, and .79, respectively). Discrepancies were resolved through discussion.

Results

Data were analyzed using logistic regression. First, analyzing responses to Question 1, we found that the more

students endorsed a fixed theory, the more likely they were to report that a newly discovered passion would unleash boundless motivation. For every unit endorsement toward a fixed theory, the odds that a participant said that a passion provides limitless motivation rose by 0.48, $\beta = -0.74$, Wald = 3.97, $p = .046$ (see Fig. 4a). Theories of interest, however, did not predict whether people reported that passions would eliminate procrastination, $\beta = 0.40$, Wald = 0.37, $p = .541$. Although we distinguished the constructs of limitless motivation and procrastination, participants may not have. Because the reference to procrastination came second within the prompt, participants may have felt they had already addressed the issue in their response about limitless motivation.

Analyzing responses to Question 2, we found that the more students endorsed a fixed theory, the less likely they were to report that pursuing a newly discovered passion would be difficult at times. For every unit of endorsement toward a fixed theory, the odds that a participant said that pursuing a passion will sometimes be difficult decreased by 3.59, $\beta = 1.28$, Wald = 4.77, $p = .029$ (see Fig. 4b).

Discussion

The more students endorsed a fixed theory, the more likely they were to think that a passion would provide endless motivation. By contrast, the more students endorsed a growth theory, the more likely they were to anticipate that pursuing a passion would sometimes be

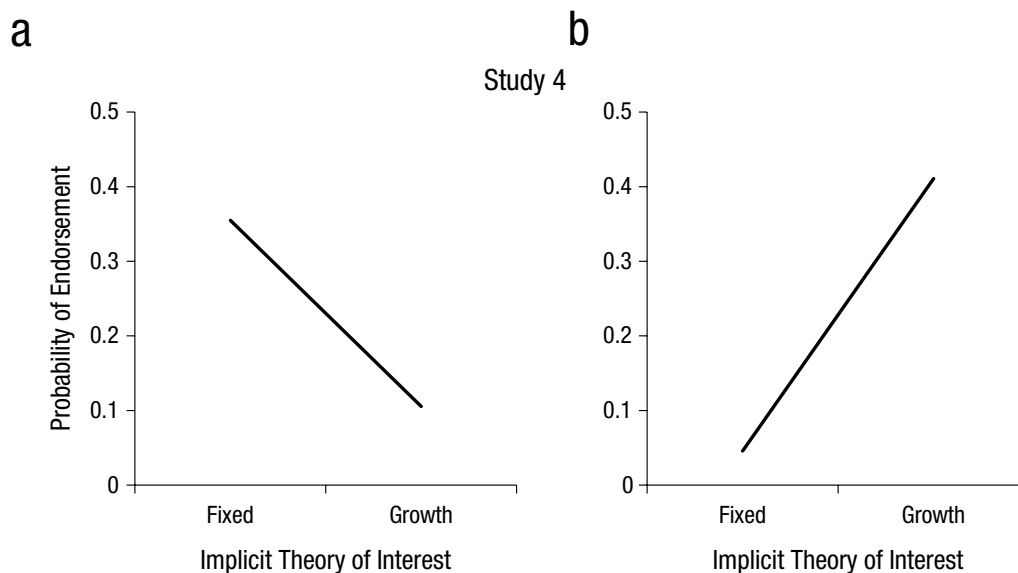


Fig. 4. Predicted probability that students endorsed the ideas (a) that passions provide limitless motivation and (b) that pursuing passions will be difficult at times, given their theory of interest (Study 4). Fixed and growth theories of interest are plotted at 1 standard deviation below and above the mean, respectively.

difficult. Although Study 4 was somewhat underpowered, it suggests the differing motivational expectations that fixed and growth theories elicit. Thus, it informed Study 5, which built on these ideas with a larger sample.

Study 5: Sustaining Interest in the Face of Difficulty

Early in college, students often take a class because the topic sparks their interest. Astronomy, for example, can seem fascinating. The vastness of space and the possibility of life in a galaxy far, far away beg to be explored. But what happens when the material becomes difficult, the concepts abstract, and the mathematics challenging? Will such difficulty signal that it was not a true interest after all? Study 4 found that people with more of a fixed theory of interest were less likely to anticipate that pursuing a new passion would be difficult at times. When this expectation is violated, does a fixed theory lead students to discount a newfound interest more readily than does a growth theory?

In Study 5, we induced theories of interest and then sparked students' interest in black holes with an engaging video. After reporting their initial level of interest in the topic, students read a challenging scientific article on the same topic and again reported their interest. We predicted that students' interest would decline more in the fixed-theory condition than in the growth-theory condition, especially among students who found the article challenging.

Method

Participants. For our primary hypothesis, we estimated that a sample size of 68 would be required in order to have 80% power to detect a medium-sized effect with three predictors ($\alpha = .05$). In total, 71 community college students took part in exchange for course credit. One participant spent more than 9 hr on the 15-min study and was therefore omitted from all analyses. Seventy participants remained (42 female students, 28 male students; age: $M = 26.26$ years, $SD = 7.92$). There were no gender differences on any measure ($F_s < 1$).

Procedure. The study was conducted entirely online. Participants were told that they would be asked to share their opinions about several videos and articles. First, each participant was randomly assigned to read either the fixed- or the growth-theory-inducing article used in Study 3. To buttress the cover story, we asked participants to report their interest in the article after completing a manipulation check. Next, participants watched a brief video (2 min 40 s) on Stephen Hawking's theory about black holes and their connection to the origins of

the universe. This video was selected following a pilot study described below to identify materials that would spark interest in a majority of participants. It was created by *The Guardian* for a general audience (Jha, Hill, & Boyd, 2013) and communicated Hawking's ideas in an accessible and exciting manner. Participants then reported their level of interest in the topic. The most strongly worded item was selected a priori to identify participants whose interest had been sparked: "What I learned about in the video was fascinating to me" (1 = *strongly disagree*, 6 = *strongly agree*). Focusing on this item allowed us to automate the selection criterion within the experimental software so that only participants who responded either "agree" or "strongly agree" (i.e., 5 or 6) proceeded to the main portion of the study. This allowed us to examine how theories of interest affect a strongly sparked interest when the topic later becomes challenging. Of the 88 participants who completed the prescreening measure, 71 (81%) qualified for the main study. There was no difference by theory condition, $\chi^2(1) = 0.30$, $p = .418$. The remaining participants were directed to the demographics survey, which concluded their participation.

Next, participants read the first page of a journal article taken from *Science* about black holes (Begelman, 2003). To ensure that participants at least began to read the article, we required them to spend at least 5 min on the page (i.e., they could not advance until 5 min had elapsed); however, they could spend as long as they wanted. The article was written for a scientific audience and was therefore far more technical and challenging than the video. After reading this article, participants rated their interest in the topic again. They also reported how difficult it was for them to understand the article. They then completed demographic items and were debriefed.

Materials. The black-holes video was part of *The Guardian's* "made simple" series of educational films (Jha et al., 2013). Before the study was conducted, this video and five others were subjected to an online pilot test to identify materials that would interest most people and thus serve as an appropriate stimulus. Forty-one participants (28 female, 13 male) watched all six videos and rated their interest in each using the same interest scale as in Study 1 ($M = 4.61$, $SD = 1.10$, $\alpha = .97$). The black-holes video was the highest rated among the six videos; 68% of pilot participants agreed or strongly agreed that it was "fascinating." Given this interest and because it appealed strongly to both male and female participants, we used it in the main study.

Measures.

Manipulation check. A single item assessed the effectiveness of the theory-of-interest manipulation: "In your opinion, how difficult is it to change core interests?" (1 = *not at all*, 7 = *extremely*).

Interest in black holes. A 12-item scale similar to that used in the previous studies was adapted to assess interest in black holes as described in the video and the article (e.g., “What I learned about in the video/article is fascinating to me,” “The things discussed in the video/article are important to me”; video: $\alpha = .84$; article: $\alpha = .95$).

Perceived difficulty of article. After reading the article, participants responded to two questions assessing the difficulty they had understanding it: “It was hard to understand this article,” and “It was difficult for me to follow what was discussed in this article” (1 = *strongly disagree*, 6 = *strongly agree*). Participants found the article moderately difficult to understand ($M = 3.77$, $SD = 1.20$).

Results

Manipulation check. Participants reported that changing core interests was significantly more difficult in the fixed-theory condition ($M = 5.31$, $SD = 1.18$) than in the growth-theory condition ($M = 3.17$, $SD = 1.48$), $t(68) = 6.68$, $p < .001$, $d = 1.60$.

Interest in black holes. As predicted, interest in black holes was high after watching the video (fixed theory: $M = 5.12$, $SD = 0.45$; growth theory: $M = 5.03$, $SD = 0.38$); there was no difference by condition, $t < 1$. There was also no difference between conditions when retaining participants who did not pass the prescreening measure, $t < 1$ (fixed theory: $M = 4.47$, $SD = 1.28$; growth theory: $M = 4.61$, $SD = 1.11$).

Turning to interest in black holes after reading the difficult article, we found that, as predicted, a mixed-model ANOVA yielded the predicted interaction, $F(1, 68) = 5.31$, $p = .024$, $\eta_p^2 = .07$. Participants in the fixed-theory condition showed a greater drop in interest in black holes than did those in the growth-theory condition.

Perceived difficulty in understanding the article as a moderator. Participants reported similar levels of difficulty understanding the article in the fixed-theory condition ($M = 3.83$, $SD = 1.31$) and in the growth-theory condition ($M = 3.71$, $SD = 1.10$), $t(68) = 0.40$, $p = .693$, $d = 0.10$. Finding the article difficult undermined interest more among students in the fixed-theory condition than among students in the growth-theory condition. We tested the effects of the theory-of-interest condition, difficulty understanding the article, and their interaction on interest in black holes after having read the article, controlling for interest after having watched the video, $\beta = 0.45$, $t(65) = 2.23$, $p = .030$. Both main effects were significant: theory condition, $\beta = 0.20$, $t(65) = 2.44$, $p = .017$; difficulty, $\beta = -0.47$, $t(65) = -6.67$, $p < .001$. These effects were qualified by the predicted interaction, $\beta = 0.18$,

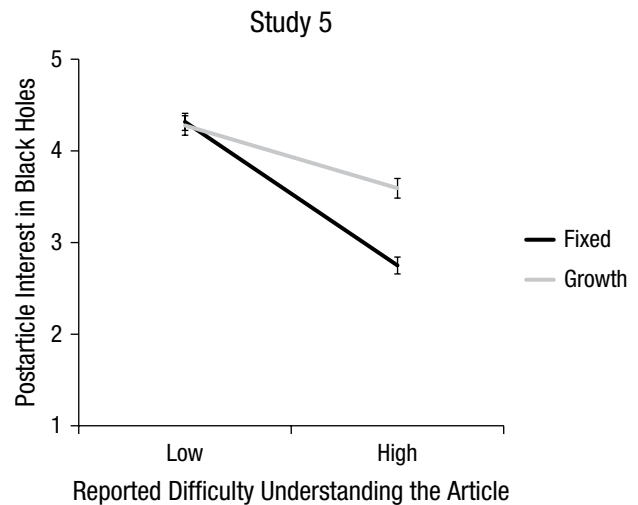


Fig. 5. Students' mean rating of interest in black holes after reading an article about them as a function of reported difficulty understanding the article and students' theory of interest (Study 5). Low and high reported difficulty are plotted at 1 standard deviation below and above the mean, respectively. The analysis controlled for interest in black holes after watching the video. The interest scale ranged from 1 to 7. Error bars represent standard errors.

$t(65) = 2.60$, $p = .012$ (see Fig. 5). Compared with students who found the article easy to understand ($-1 SD$; predicted $M = 2.58$), students who found it difficult ($+1 SD$; predicted $M = 4.96$) expressed less interest in black holes both in the fixed-theory condition, $\beta = -0.65$, $t(65) = -7.04$, $p < .001$, and in the growth-theory condition, $\beta = -0.29$, $t(65) = -2.69$, $p = .009$. However, most critical to our hypothesis, among students who found the article difficult, those in the fixed-theory condition reported significantly less interest than did those in the growth-theory condition, $\beta = 0.42$, $t(65) = 3.59$, $p < .001$. Among those who found it easy to understand ($-1 SD$), there was no difference by theory condition, $\beta = -0.02$, $t < 1$.

Despite their fascination with black holes expressed just minutes earlier following the video, students in the fixed-theory condition who found the article difficult ($+1 SD$) reported interest in black holes (predicted $M = 2.75$ on a 6-point scale) significantly below the scale midpoint (3.50), one-sample $t(69) = -6.33$, $p < .001$, $d = 0.76$. For students in the growth-theory condition who found the article similarly difficult, this decline was attenuated (predicted $M = 3.59$).

Discussion

After watching a popular science video about black holes, most students were fascinated. Then they read a challenging scientific article about the same topic, which caused students' interest to drop. This drop, however, was greater for students in the fixed-theory condition than the growth-theory condition. Moreover,

among students who found the article difficult to understand, those in the fixed-theory condition expressed less interest in the topic than did those in the growth-theory condition.

Study 4 found that students with a stronger fixed theory were less likely to anticipate difficulties in pursuing passions. Study 5 found that inducing a fixed theory led students to discount a newfound interest more definitively after exposure to challenging content. Difficulty may have signaled that it was not their interest after all. Taken together, students endorsing a growth theory may have more realistic beliefs about the pursuit of interests, which may help them sustain engagement as material becomes more complex and challenging.

General Discussion

Fixed and growth theories of interest lead people to approach interests in quite different ways. Relative to a growth theory, a fixed theory reduces interest outside people's preexisting interests (Studies 1–3). Within people's area of interest, a fixed theory, more than a growth theory, leads people to anticipate that a passion will provide limitless motivation and that pursuing it will not be difficult (Study 4). When this expectation is violated, a fixed theory leads to a sharper decline in interest—as if the person comes to think that the topic was not his or her interest after all (Study 5). A growth theory, by contrast, leads people to express greater interest in new areas, to anticipate that pursuing interests will sometimes be challenging, and to maintain greater interest when challenges arise. These differences were found both when we assessed naturally occurring variation in theories of interest (Studies 1, 2, and 4) and when we experimentally induced theories, demonstrating their causal effect (Studies 3 and 5).

Implicit theories of interest contribute to extant theory regarding the development of interest. The four-phase model (Hidi & Renninger, 2006) assumes that people view interests as developed. Our work, however, suggests that the development of interest may vary significantly as a function of the implicit theory of interest that a person holds. A fixed theory may prevent a person from initiating the developmental process in new areas and thwart the process if the person encounters difficulty. In turn, given the way in which interests can engender intrinsic motivation (O'Keefe, Horberg, & Plante, 2017), theories of interest may shape the degree to which people develop intrinsic rather than solely extrinsic (e.g., getting a good grade) motivations (see O'Keefe & Harackiewicz, 2017).

An important question for future research is how theories of interest play out in real-life settings. The more limited range of interests that arises from a fixed

theory is not in itself a liability and may, in some circumstances, reduce distraction as a person deepens pursuit of a topic. A fixed theory could, however, be disadvantageous when advances require interdisciplinary knowledge and the integration of ideas from diverse sources. It could also become a liability if people fail to explore topics that could become strong interests or if, in the face of difficulty or setbacks, it leads people to question their commitment and lose interest in an area. In these cases, the greater openness to new areas and greater resilience facilitated by a growth theory would be advantageous.

The injunction to find your passion draws on an independent view of the self in which important properties are seen as arising from within individuals and as defining them in contrast to others (Markus & Kitayama, 1991). In interdependent cultural contexts, by contrast, interests may be understood as arising from duties and the desire to maintain harmony in families and communities. An important direction for future research is to explore cultural variation in interests and theories of interest. It is also important to explore boundary conditions within independent cultural contexts. We focused on college students because they are developing their interest identities and enjoined to “find your passion” (Frank, 2016). Whether other populations would show similar patterns is not known (see the Supplemental Material).

The message to find your passion is generally offered with good intentions, to convey not to worry so much about talent, not to bow to pressure for status or money, and to just find what is meaningful and interesting to you. Unfortunately, the belief system that this message may engender can undermine the very development of people's interests.

Action Editor

John Jonides served as action editor for this article.

Author Contributions

All the authors developed the study concepts and contributed to the study designs. For all studies, data were collected and analyzed by P. A. O'Keefe. All authors interpreted the results. P. A. O'Keefe drafted the manuscript, and C. S. Dweck and G. M. Walton provided critical revisions. All the authors approved the final manuscript for submission.

Acknowledgments

We thank E. J. Horberg for her contributions to this research.

Declaration of Conflicting Interests

The author(s) declared that there were no conflicts of interest with respect to the authorship or the publication of this article.

Funding

Research reported in this publication was supported in part by the Ruth L. Kirschstein National Research Service Award for Individual Postdoctoral Fellows from the National Institute of Child Health and Human Development of the National Institutes of Health under Award No. F32HD062185. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

Supplemental Material

Additional supporting information can be found at <http://journals.sagepub.com/doi/suppl/10.1177/0956797618780643>

Open Practices



All data have been made publicly available via the Open Science Framework (OSF) and can be accessed at <https://osf.io/j7hdm>. Materials for Studies 1 to 3 can be found at the OSF (<https://osf.io/dmfq/>), and materials for Studies 4 and 5 can be found in the article or in the Supplemental Material available online. Data and analysis plans for Studies 1 and 2 can be found at <https://osf.io/dmfq/> and <https://osf.io/5fzqp/>, respectively. The remaining studies were conducted before the norms of preregistration were established. The complete Open Practices Disclosure for this article can be found at <http://journals.sagepub.com/doi/suppl/10.1177/0956797618780643>. This article has received the badges for Open Data, Open Materials, and Preregistration. More information about the Open Practices badges can be found at <http://www.psychologicalscience.org/publications/badges>.

References

- Beer, J. S. (2002). Implicit self-theories of shyness. *Journal of Personality and Social Psychology*, *83*, 1009–1024.
- Begelman, M. C. (2003). Evidence for black holes. *Science*, *300*, 1898–1903.
- Chen, P., Ellsworth, P. C., & Schwarz, N. (2015). Finding a fit or developing it: Implicit theories about achieving passion for work. *Personality and Social Psychology Bulletin*, *41*, 1411–1424.
- Dweck, C. S. (1999). *Self-theories: Their role in motivation, personality, and development*. New York, NY: Psychology Press.
- Dweck, C. S., Chiu, C. Y., & Hong, Y. Y. (1995). Implicit theories and their role in judgments and reactions: A word from two perspectives. *Psychological Inquiry*, *6*, 267–285.
- Erdley, C. A., & Dweck, C. S. (1993). Children's implicit personality theories as predictors of their social judgments. *Child Development*, *64*, 863–878.
- Frank, T. (2016, January 15). *Stop trying to find your passion*. Retrieved from <https://collegeinfo geek.com/stop-trying-to-find-your-passion/>
- Gosling, S. D., Rentfrow, P. J., & Swann, W. B., Jr. (2003). A very brief measure of the Big-Five personality domains. *Journal of Research in Personality*, *37*, 504–528.
- Hidi, S., & Renninger, K. A. (2006). The four-phase model of interest development. *Educational Psychologist*, *41*, 111–127.
- Hornby, G. S., & Kurtoglu, T. (2009). Toward a smarter Web. *Science*, *325*, 277–278. doi:10.1126/science.1174400
- Jha, A., Hill, M., & Boyd, P. (2013, September 19). Stephen Hawking's big ideas . . . made simple. *The Guardian*. Retrieved from <http://www.theguardian.com/news/video/2013/sep/19/stephen-hawking-history-time-simple-video>
- Job, V., Dweck, C. S., & Walton, G. M. (2010). Ego depletion—Is it all in your head? Implicit theories about willpower affect self-regulation. *Psychological Science*, *21*, 1686–1693.
- Klein, R. (2010). The future of literary criticism. *Proceedings of the Modern Language Association*, *125*, 920–923.
- Knee, C. R. (1998). Implicit theories of relationships: Assessment and prediction of romantic relationship initiation, coping, and longevity. *Journal of Personality and Social Psychology*, *74*, 360–370.
- Knee, C. R., Patrick, H., Vietor, N. A., Nanayakkara, A., & Neighbors, C. (2002). Self-determination as growth motivation in romantic relationships. *Personality and Social Psychology Bulletin*, *28*, 609–619.
- Knee, C. R., & Petty, K. N. (2013). Implicit theories of relationships: Destiny and growth beliefs. In J. Simpson & L. Campbell (Eds.), *The Oxford handbook of close relationships* (pp. 183–198). New York, NY: Oxford University Press.
- Linnenbrink-Garcia, L., Durik, A. M., Conley, A. M., Barron, K. E., Tauer, J. M., Karabenick, S. A., & Harackiewicz, J. M. (2010). Measuring situational interest in academic domains. *Educational and Psychological Measurement*, *70*, 647–671.
- Markus, H. R., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. *Psychological Review*, *98*, 224–253.
- O'Keefe, P. A. (2013). Mindsets and self-evaluation: How beliefs about intelligence can create a preference for growth over defensiveness. In S. B. Kaufman (Ed.), *The complexity of greatness: Beyond talent or practice* (pp. 119–134). Oxford, England: Oxford University Press. doi:10.1093/acprof:oso/9780199794003.003.0008
- O'Keefe, P. A., & Harackiewicz, J. M. (Eds.). (2017). *The science of interest*. New York, NY: Springer.
- O'Keefe, P. A., Horberg, E. J., & Plante, I. (2017). The multifaceted role of interest in motivation and engagement. In P. A. O'Keefe & J. M. Harackiewicz (Eds.), *The science of interest* (pp. 49–67). New York, NY: Springer.
- Schroder, H. S., Dawood, S., Yalch, M. M., Donnellan, M. B., & Moser, J. S. (2016). Evaluating the domain specificity of mental health-related mind-sets. *Social Psychological & Personality Science*, *7*, 508–520.