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ORIGINAL ARTICLE

Implicit Theories Relate to Youth Psychopathology, But How? A Longitudinal Test of Two Predictive Models

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Abstract Research shows relations between *entity theories*—i.e., beliefs that traits and abilities are unchangeable—and youth psychopathology. A common interpretation has been that entity theories lead to psychopathology, but another possibility is that psychopathology predicts entity theories. The two models carry different implications for developmental psychopathology and intervention design. We tested each model's plausibility, examining longitudinal associations between entity theories of thoughts, feelings, and behavior and psychopathology in early adolescents across one school year (N = 59, 52 % female, ages 11–14, 0 % attrition). Baseline entity theories did not predict increases in psychopathology; instead, baseline psychopathology predicted increased entity theories over time. When symptom clusters were assessed individually, greater youth internalizing (but not externalizing) problems predicted subsequent increases in entity theories. Findings suggest that the commonly proposed predictive model may not be the only one warranting attention. They suggest that youth psychopathology may contribute to the development of certain kinds of entity theories.

Keywords Implicit theories · Mindset · Early adolescence · Internalizing problems · Developmental psychopathology · Mental health

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Introduction

Early adolescence is characterized by immense social, biological, and psychological change [1]. It is also a critical vulnerability period for the emergence of mental health problems. Rates of major depressive disorder [2, 3], certain anxiety disorders [4, 5], and aggression [6] all increase beginning early in adolescence. In turn, these disorders often create additional problems for youth development spanning social, academic, and motivational domains [7, 8]. Thus, there is a need to identify (a) factors that increase risk for youth mental health problems, as such knowledge might help reduce their prevalence, and (b) factors that exacerbate the negative impacts of mental health problems on youth development.

One factor potentially relevant to (a) or (b) comes from emerging literature on *implicit theories*: beliefs about the inherent malleability of personal abilities and traits. Some studies suggest that children begin to develop and act in accordance with implicit theories as early as kindergarten [9, 10] and preschool [11], and these theories can have considerable impacts on their academic, social, and emotional outcomes. For example, beliefs that personal traits are fixed and unchangeable (entity theories), as opposed to changeable through effort (incremental theories), have shown consistent links to higher levels of internalizing problems, including anxiety and depression, and externalizing youth problems, including conduct and behavioral difficulties [12]. This association has typically been interpreted to suggest that entity theories across domains predict increases in youth psychopathology over time [13, 14]. However, this account represents just one of two predictive models that may explain the association. Entity theories may indeed predict the development of youth internalizing and externalizing problems, as suggested in previous

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literature; but, alternatively, mental health problems may predict the emergence of stronger entity theories in some domains. Multiple studies have shown that adolescents' implicit theories are malleable: for instance, youths with entity theories of their intelligence, personality, or social skills can develop stronger incremental theories in these domains over time; see Yeager et al. [15], for a review. The malleability of implicit theories suggests the viability of this alternate pathway. The two models would have very different implications for the development of belief systems and psychopathology, and for approaches to prevention and treatment. For example, interventions focused on altering implicit theories to reduce psychopathology rest on the first model, the view that implicit theories lead to mental health outcomes; the alternative model would not support that intervention approach. The relative merits of the two predictive models can be fairly assessed only within a longitudinal design. Accordingly, this study examined prospective links between implicit theories and mental health problems in early adolescents, over the course of one school year.

Entity and Incremental Theories

Implicit theories appear to be linked to both mental health problems and youth functioning in other important domains. According to Dweck's [16–18] achievement motivation theory, youths tend to view their personal traits and abilities as either fixed and uncontrollable (entity theory) or malleable through effort (incremental theory). Much of Dweck's work has explored youths' implicit theories regarding intelligence. One study found that youths with an entity theory of intelligence made fewer academic improvements than youths with an incremental theory, even after controlling for baseline term grades [19]. Further, after receiving a negative evaluation on a math exam, youths with an incremental intelligence theory recovered more quickly from their initial poor performance (i.e., they succeeded on subsequent tests) compared to youths with an entity theory. Other studies have examined implicit theories regarding social competence. Erdley et al. [20] found that youths with entity theories of personality and social competence attributed peer-related setbacks to poor ability; they shortly gave up on trying to build friendships. In contrast, incrementally oriented youths attributed social setbacks to inadequate effort and sought to improve their friendships. More recently, Rudolph [21] found that youths who viewed social competence as fixed pursued social goals that minimized their risk of social rejection, whereas youths who believed social competence could be improved reported stronger desire to engage with their peers. The literature on this body of evidence suggests that believing social competence, personality, and

intelligence are fixed traits may limit young people's potential to improve their scholastic and social success [15]. The idea is that when faced with stressors or setbacks, youths who subscribe to entity theories may engage in more defeating self-talk, give up prematurely, and engage in less creative problem-solving.

These intriguing findings raise questions about the relation between youths' implicit theories and domains *beyond* intelligence and social competence, perhaps extending into mental health. For example, while research on implicit theories has focused primarily on trait-like attributes, such as intelligence and personality, some researchers have begun to explore people's beliefs about the malleability of *states*, such as emotion. Indeed, evidence suggests that, while some people view emotional experiences as beyond individuals' control, others view them as states that individuals can change (for a detailed discussion on lay theories of emotion, see Ben-Artzi and Mikulincer [22]). The examination of implicit theories of emotion may be especially important, given the pervasive impact of emotion on human psychological and social functioning. In support of this notion, some studies have found that youths and young adults holding an entity theory of emotion report more depressive symptoms than youths with an incremental theory of emotion [23, 24]. These findings, focused exclusively on depressive symptoms and on implicit theories regarding emotion, suggest the potential of a broader mental health focus. With this broader emphasis in mind, we expanded on these studies, by focusing on relations between early adolescents' internalizing and externalizing mental health problems and their implicit theories about three relatively unexplored domains, all related to mental health: thoughts, emotions, and behaviors.

Difficulty controlling these three domains is central to many forms of psychopathology. For example, intransigent unrealistic cognitions are core elements of internalizing problems (e.g., depression and anxiety) and the impulsive anger that can lead to externalizing problems; an inability to alter negative emotions is also central to depression and anxiety as well as anger and aggression; and difficulty altering behavior underlies the lethargy and poor activity selection that goes with depression, the avoidance of feared situations that characterizes anxiety, and the impulsive acting out that defines so much of externalizing dysfunction. Given the relevance of thoughts, feelings, and behaviors to both internalizing and externalizing psychopathology, it is not surprising that strategies for controlling these three domains are central to cognitive behavioral therapy (CBT), the current treatment of choice for a wide variety of youth emotional and behavioral problems [25]. CBT trains youths in skills including cognitive restructuring, emotion management (e.g., through

relaxation and calming exercises), and behavioral regulation (e.g., through behavioral activation for depression, and graduated exposure for anxiety), to decrease symptomatology and improve mental health.

Considerable evidence supports the connection between mental health problems and perceived control over thoughts, feelings, and behavior, among early adolescents in particular. Early adolescents who believe that they have little control over their thoughts or feelings, and that their actions cannot affect their environment, are at increased risk for developing multiple forms of psychopathology, both internalizing and externalizing [26–30]. Notably, youths' entity theories may be associated with low perceived control, but they are distinct in two key ways. First, perceived control is usually measured in explicitly self-referential ways: a child may feel that *she* has little personal control over her environment while believing that others *do* have such control. In contrast, implicit theories are broad beliefs about *how the world works*: a child with an entity theory of intelligence believes that intelligence is a fixed, uncontrollable quality *in general,* not just for herself alone. So, youths' implicit theories regarding the inherent controllability of thoughts, feelings, and behaviors may relate differently to youth mental health than perceptions of personal control do.

These implicit theories may be associated with how youths choose to cope with stressors and, in turn, related to their mental health outcomes. This possibility was suggested by a recent meta-analysis of 17 studies that examined relations between entity theories and mental health problems in youths [12]. Overall, findings indicated that youths holding stronger entity theories showed more pronounced emotional and behavioral problems. The meta-analysis found no evidence for moderation of this relation by youth characteristics (e.g., gender or age), methodological factors, or entity theory domain; in other words, the association emerged as highly consistent. Although this study strongly suggests the relevance of entity theories to youth psychopathology, it also highlights areas in need of further investigation. For instance, only two of the studies reported longitudinal data, so questions of directionality remain largely unexplored. The first of these two studies found that early adolescents endorsing entity theories of intelligence, compared to those endorsing incremental theories, showed larger increases in depressive symptomatology 3 weeks later [13]. The second study found that entity theories of personality—specifically, believing that "people are either bullies or victims, and there's not much they can do about it"—predicted increases in high school students' aggressive desires across an 8-month period [31]. Both of these studies support a model in which entity theories predict increased symptoms over time. However, both studies assessed just one of two possible predictive

models: the effect of entity theories on subsequent changes in symptoms was tested, but the effect of baseline symptoms on subsequent changes in entity theories was not. To build on these interesting findings, and provide a somewhat more complete test of longitudinal relations between implicit theories and youth problems, the present study assessed associations between youths' entity theories regarding thoughts, feelings, and behaviors and internalizing and externalizing problems across a school year. The model that conceptualizes entity theories as predictors of mental health outcomes—specifically, that "implicit theories should predict adjustment and behavior" [15, p. 873]—is important and theoretically plausible, and it has gained some empirical support, as noted. However, it may not be the only model that warrants attention. Additionally, evidence suggests that implicit theories across different domains, including intelligence, personality, and social competence, are conceptually distinct and empirically independent of one another [24]. Thus, despite initial evidence that entity theories of intelligence and personality may predict increases in youth problems, different kinds of implicit theories—such as those related to thoughts, feelings, and behavior—may show different patterns in relation to youth mental health problems over time. Exploring these possible differences will contribute to a more comprehensive picture of how implicit theories across many domains are linked to youth emotional and behavioral problems.

Implicit Theories and Mental Health: Alternate Predictive Model

While entity theories of thoughts, feelings, and behavior may predict youth mental health trajectories, another predictive model relating these constructs is also plausible: youths who have more significant mental health problems may be more susceptible to developing entity theories in these domains. For instance, the implicit theories of youths who have persistent conduct, anxiety, or affective problems may be influenced by their ongoing difficulty controlling their own symptoms despite continued effort; this could undermine their belief in malleability. As a consequence, they may come to doubt the malleability of thoughts, feelings, and behavior, and these doubts may in turn strengthen entity theories regarding these domains over time. Thus, a second plausible developmental pattern is that mental health problems may precede entity theories, rather than the reverse.

There are at least two reasons why this model might be plausible. First, several studies have shown that adolescents' implicit theories can change. Following brief interventions teaching incremental theories of intelligence or personality, adolescents tend to act in ways more consistent with incremental theories in these domains: they show

more effort when faced with academic challenge and greater resilience when faced with lab-based social stressors [15]. Likewise, other studies have successfully induced entity theories of intelligence in children and adults, suggesting that external experiences can shape the implicit theories that people hold [16–18]. Second, although this alternative model has not been tested in the context of youth mental health, one study found identified incremental theories of intelligence as both a cause *and* consequence of greater academic achievement in ninth grade students [32], suggesting the potential of this alternate pathway.

These two alternative predictive models would have different implications for our understanding of developmental trajectories, and for models of prevention and treatment. First, disentangling the directional link between implicit theories of thoughts, feelings, and behavior and youth mental health may help clarify how these implicit theories develop. Prior studies have suggested that environmental factors, including the kinds of feedback youths receive from parents and teachers [33, 34], may contribute to the development of different implicit theories. It is possible that mental health problems also play a role in the formation of entity theories, as we described above. Learning whether this is the case could enrich our understanding of how different implicit theories develop. One possibility is that a complete developmental account might include both internal processes (e.g., emotional and behavioral difficulties) and environmental factors (e.g., feedback from adults).

The two alternative predictive models would also carry different implications for prevention and treatment strategies. If implicit theories of thoughts, feelings, and behavior precede and predict the onset of mental health problems, optimal intervention design might involve strategies for boosting incremental theories in these domains. However, if mental health problems precede and predict the development of entity theories of thoughts, feelings, and behavior and not the reverse, then interventions might need to focus on other processes that are more directly linked to the initiation or maintenance of the mental health problems.

Present Study

In the present study, we sought to contribute to a map of longitudinal associations between implicit theories of thoughts, feelings, and behavior and mental health problems in early adolescents. The study tested the viability of two plausible models for the relation between entity theories of thoughts, feelings, and behavior and youth mental health over time: (1) the traditional model, that stronger entity theories predict increases in mental health problems; and (2) an alternate model, that greater mental health problems predict increases in entity theories. We collected measures of implicit theories and youth mental health problems at three time points during one school year, to test the following hypotheses:

Hypothesis 1: Stronger entity theories regarding the malleability of thoughts, feelings, and behaviors correlate positively with greater mental health problems in early adolescents.

Hypothesis 2: Higher T1 (baseline) levels of these entity theories predict subsequent increases in mental health problems in early adolescents.

Hypothesis 3: Higher T1 levels of mental health problems predict subsequent increases in entity theories of thoughts, feelings, and behaviors in early adolescents.

Because theory and evidence suggest that both directional relations between implicit theories and youth psychopathology are plausible, we hypothesized that both models would emerge as significant. Because entity theories across various domains have shown consistent, significant links with both internalizing and externalizing youth problems, we did not have specific hypotheses regarding different problem types in relation to entity theories of thoughts, feelings, and behaviors. To our knowledge, the present study is the first to test competing predictive models of relations between implicit theories of thoughts, feelings, and behaviors and youth mental health. It is also one of few existing studies on longitudinal links between implicit theories and psychiatric symptoms in youths [9]. Finally, our focus on early adolescence provided a look at the interplay of implicit theories and mental health during a theoretically important transitional life stage when risk of psychopathology increases markedly [35–37].

Methods

Recruitment and Study Procedures

Youths were recruited from two schools (see below) in a large city in the northeastern United States. All research procedures for this study were approved by the IRB of XX University, and all participating parents and youths signed informed consent/assent documents prior to the start of the study. Youths were eligible for the study if they were in grades 6 through 8 at the time of recruitment. All had English fluency sufficient to provide consent/assent and complete the study measures, so no willing participant was excluded.

In all, 302 youths were invited to participate in the study via a flyer sent home to all families at a large public middle school (N = 286) and a small private middle school (N = 16). Families could volunteer to participate in the study by mailing a signed consent letter to the research team. The resulting sample included 59 youths, most from the public middle school (86.44 %) and some from the small private school. At Time 1, ages ranged from 11 to 14 years (M = 12.30), and 52.54 % were girls (compared to 49.02 % of students in the full school district), 51.80 % European-American (compared to 39.00 % in the district), 16.10 % African-American (compared to 28 % in the district), 3.60 % Asian-American (compared to 12.40 % in the district), 12.10 % Hispanic or Latin-American (compared to 13.5 % in the district), and 16.10 % "other/mixed" (6.4 % in the district). Some 59.60 % lived in dual-parent homes, with fewer living with only one parent (22.80 %) or with two separated parents for equal amounts of time (7.00 %); 8.80 % of youths lived with family members other than parents, including aunts, uncles, and grandparents. We compared youths attending public versus private school, on the demographic variables noted in this paragraph and the clinical variables listed in Table 1; there were no significant differences.

Measures and Assessment Timing

The study spanned one school year, with one assessment point each in the fall, winter, and spring; to reduce variability caused by unusual school circumstances, we did not conduct assessments during the predictably chaotic initial and final 6 weeks of the academic calendar. Participating youths completed all assessments during school hours in a separate, quiet classroom. Assessments were completed in groups of 3–15 youths, and all assessment sessions were supervised by one to two members of the research team (the principal investigator and/or trained research assistants). The mean gap between assessment points was 62.50 days, and no youth missed any assessment (attrition = 0 %). The assessments included the following measures:

Youth well-being and symptomatology: The Strengths and Difficulties Questionnaire (SDQ [35]; see "Appendix") is a 25-item, youth-report behavioral screening tool providing coverage of youths' behavior, emotions and peer relations. It comprises five scales of five items each rated on a 3-point scale. The scales are emotional symptoms, conduct problems, hyperactivity, peer problems and prosocial behavior. A total psychological difficulties score ("Total Problems Score") ranging from 0 to 40, representing increasing difficulties, is derived by summing scores on the first four of these subscales; the prosocial behavior subscale serves as a separate metric of positive

youth functioning. In this study, students completed the version of the SDQ for youths [38]. The SDQ has shown excellent acceptability and internal consistency in US and UK community youth samples [39]. Further, test–retest reliabilities have ranged from .70 to .96 for the total and subscale scores in prior studies [40, 41]. Convergent validity of the SDQ has been evaluated by showing substantial correlations with other instruments of psychological adjustment, such as the Youth Self-Report, or YSR [42]. The SDQ discriminates well between children with and without psychopathological symptoms [42]. In this study, alphas for the SDQ total score were .77 at T1, .72 at T2, and .71 at T3.

Analyses in this study tested links between the SDQ Total Problems Score and implicit theories of thoughts, feelings, and behavior. In addition, these theories' relations to the emotion and conduct problems SDQ subscales were of particular interest. Examining these two symptom clusters individually fits with a long history of focusing on internalizing and externalizing problems as the core broadband forms of psychopathology in youths. In community youth samples, the SDQ emotion subscale has shown strong, positive correlates with the broadband internalizing scale on the YSR (r = .74). Likewise, the SDQ conduct subscale has shown consistently strong, positive links with the YSR's broadband externalizing subscale (r = .84) [43]. In this study, alphas for the SDQ emotion subscale score were .81 at T1, .75 at T2, and .77 at T3; for they SDQ conduct subscale score, alphas were .75 at T1, .72 at T2, and .72 at T3.

Youth implicit theories about feelings, thoughts, and behaviors: Implicit Thoughts, Emotion, and Behavior Questionnaire (ITEB-Q; see "Appendix"). This study included a new scale adapted from Dweck's work on implicit theories for intelligence [44] to measure implicit theories regarding thoughts, emotions, and behaviors. Implicit theories of personal traits, including intelligence [18, 44], peer relationships [45], emotions [24], and aggression [31, 46], are routinely measured in early adolescent populations via brief self-report measures. These measures all follow a shared structure first outlined by Dweck and Henderson [44]: respondents indicate the degree to which they agree with a series of statements describing extreme entity or extreme incremental theories about the malleability of specific personal traits (e.g., "You can always change how intelligent you are" [17]). Implicit theories questionnaires administered to early adolescents have consistently shown moderate to high internal consistency, test–retest reliability, and construct validity, regardless of the personal trait targeted by the measure [e.g. 13, 18, 28, 47]. Thus, the ITEB-Q was modeled directly after previously developed implicit theories measures used with youth populations.

Table 1 Means and standard deviations for study variables across all assessment points

	Mean T1	SD T1	Mean T2	SD T2	Mean T3	SD T3
SDQ—total youth problems	14.65	4.22	14.91	5.10	15.69	5.99
SDQ—prosocial	8.65	1.59	8.36	1.61	8.50	1.79
SDQ—emotional problems	2.58	2.06	2.74	2.01	2.91	2.51
SDQ—hyperactivity	6.07	1.75	6.07	2.07	6.33	2.00
SDQ—conduct problems	3.32	1.18	2.31	1.45	2.45	1.88
SDQ—peer problems	5.68	1.93	3.79	2.08	4.00	2.22
ITEB-Q—implicit theories, feelings	7.79	2.26	7.44	1.79	7.59	2.34
ITEB-Q—implicit theories, thoughts	7.81	2.13	7.33	1.66	7.53	2.40
ITEB-Q—implicit theories, behavior	7.67	2.12	7.37	1.82	7.41	2.46

SDQ Strengths and Difficulties Questionnaire, *ITEB-Q* Implicit Thoughts, Emotions, and Behaviors Questionnaire

The ITEB-Q contains twelve items; four items each address implicit theories regarding thoughts, feelings, and behavior. Youths are instructed to "Please circle whether you think each statement below is Very False, False, True, or Very True for kids your age." Items on each subscale present extreme incremental theory beliefs (e.g., "When you try, you can control how you feel," "When you feel bad, you can make yourself feel better"). Youths are asked to indicate the degree to which they agree with each statement using a four-point scale ranging from 1 ("Very False") to 4 ("Very True"). The total scale was designed to yield three subscales: one each representing theories of thoughts, feelings, and behavior. We exploratory factor analysis (EFA) to assess the factor structure of the twelve ITEB-Q items. For this EFA, we used maximum likelihood extraction and oblique (promax) rotation to account for expected correlations among factors. A scree plot indicated the presence of three factors in this EFA. The first accounted for 38.15 % of variance (eigenvalue = 4.58), the second, 17.40 % of the variance (eigenvalue = 2.09), and the third, 9.77 % of the variance (eigenvalue = 1.17). Factor loadings from the pattern matrix are presented in Supplement A. All four "behavior" items loaded onto the first factor, all "feelings" items loaded onto the second factor, and all "thoughts" items loaded onto the third factor at .30 or higher. In addition, cross-loadings emerged for two items; one "feelings" item cross-loaded onto factor 1 (the "behavior" factor), and one "thoughts" item cross-loaded onto factor 2 (the "feelings" factor). There are at least two possible reasons for these cross-loadings. First, conducting EFA with relatively small samples can produce unstable factor structures; thus, the present EFA represents a tentative factor structure for the ITEB-Q and should be replicated using larger youth samples. Second, the subscales on the ITEB-Q target conceptually related constructs, which leads to cross-loadings in factor analyses. Indeed, the three ITEB-Q subscales correlated very highly with one another at all three study time points (rs =

.81–.92), and each subscale correlated $r = .92$ or greater with the total ITEB-Q score, suggesting considerable overlap across these constructs. Even with these cross-loadings, this EFA provides conservative evidence for a three-factor structure in the ITEB-Q, supporting implicit theories of thoughts, feelings, and behaviors as separable but highly related constructs. That is, they may represent different kinds of implicit theories, but theories in these domains may "track" together within individuals. This is in contrast to implicit theories in less conceptually linked domains, such as theories of intelligence and of emotion, which research suggests are fully distinct constructs [24].

Consistent with prior research on youth implicit theories, implicit theories were measured on a continuous scale in this study: the higher participants' summed scores on the full ITEB-Q, the less they believe thoughts, emotions, and behavior are fixed entities, respectively. In this study, Cronbach's alphas were .76 at T1, .74 at T2, and .75 at T3 for the "feelings" subscale; .76 at T1, .82 at T2, and .80 at T3 for the "thoughts" subscale; and .77 at T1, .76 at T2, and .74 at T3 for the "behavior" subscale. These values are consistent with prior alphas for implicit theories for youths, including measures of implicit theories regarding personality (.82; [34]), math ability (.90; [50]), and general intelligence (.78; [21]). Correlations within subscales at T1 and T2 ranged from .46 to .57, and at T1 and T3, .57 to .60, providing a conservative estimate of test–retest reliability for each subscale.[1]

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[1] In addition to the ITEB-Q and the SDQ, a new measure was included in this study, which assessed youths' expectations regarding how they would respond to various setbacks (e.g., social rejection, academic failure). This measure was included for the purposes of examining its psychometric properties and will require further development before inclusion in research reports on implicit theories and youth mental health.

Data Analyses

To test whether entity theories (ITEB-Q subscale scores) and youth mental health problems were associated with one another, zero-order correlations were examined within and across the three study assessment points. To test the competing predictive models outlined in the introduction, we considered several approaches to analyzing longitudinal panel data. The first approach considered was growth curve modeling, which estimates between-subject differences in within-subject trajectories of variables' change over time [48, 49]. Despite the rich information that growth curve models can yield, the preferred sample size for constructing reliable, well-powered growth curve models is at least $N = 100$ [50], with smaller samples leading to inaccurate estimates of regression coefficients and standards errors [51]. Further, it is generally suggested that modeling linear growth—the simplest shape a growth curve can take—requires at least four to five measurement occasions, and more complex models may demand substantially more than that [49, 52, 53]. Therefore, given the present sample of $N = 59$ and the study's three measurement occasions, growth curve modeling would be an inappropriate analytic strategy. An alternative approach considered was hierarchical linear regression, which can determine the extent to which a given predictor variable uniquely accounts for change in a dependent variable, over and above specified covariates. To test the appropriateness of this approach, power analyses were conducted using G*Power 3.1 to calculate the required sample size to achieve sufficient power $(1 - \beta)$ to detect change in R^2 of small $(f^2 = .02)$, medium $(f^2 = .15)$, and large effect sizes $(f^2 = .35)$ with α set at .05 (Cohen 1988). Accounting for all planned covariates (described below), total sample sizes calculated were 776, 107, and 48, respectively, indicating that this study was appropriately powered to detect medium-to-large effect sizes in hierarchical linear regression analyses. Because this approach would yield sufficient information to test the study hypotheses, we conducted a series of hierarchical linear regression models to compare the viability of the competing predictive models outlined in the introduction.

In Step 1 of these models, T1 SDQ scores were entered, along with a number of covariates (detailed below). In Step 2, the predictor of interest (T1 ITEB-Q subscale score) was entered in each of the two models. For the first model, T2 SDQ was entered as the dependent variable, and for the second, T3 SDQ was entered. For any model indicating the Step 2 variable as a significant predictor of T2 or T3 SDQ score, specificity of this effect to specific emotional and/or conduct problems was assessed through additional hierarchical regression analyses. Similar tests were conducted for exploratory purposes using the hyperactivity and peer problems subscales.

Similar procedures were used to test whether T1 levels of mental health problems predicted changes in ITEB-Q subscale scores over the course of the study. In Step 1 of these two models, T1 ITEB-Q subscale score was entered, along with several covariates (detailed below). In Step 2, T1 SDQ was entered, and dependent variables were T2 or T3 ITEB-Q subscale score, respectively. If T1 SDQ emerged as a significant predictor of changes in ITEB-Q subscale scores, further regression models were conducted to assess predictive effects of specific symptom clusters on ITEB-Q subscale trajectories across the study period.

Several covariates were included in Step 1 of all regression models in this study. First, due to intercorrelations among ethnicity, socioeconomic status, and youth problems [54, 55], we covaried youth ethnicity and maternal education level, a common proxy for socioeconomic status used in research on youth psychopathology (for examples of studies using this proxy, see [56–58]. Maternal education level was divided into 5 categories and included in analyses as a continuous variable: less than high school (1); some high school (2); graduated high school (3); some college (4); and graduated college (5).[2] We also included youth age and gender as covariates, given varying ages of onset for different kinds of psychological problems, and gender differences in prevalence rates for certain emotional and behavioral problems during the adolescent years [58]. To account for possible demographic differences across schools, we also controlled for school type (public vs. private). Reported results include covariates in analyses.

Results

Descriptives and Correlations

Means and standard deviations for all variables, across time points (T1, T2, T3), are presented for the total sample in Table 1, and zero-order correlations among variables across time points are shown in Table 2. Correlations were in anticipated directions: greater youth problems correlated with higher entity theories of thoughts, feelings, and behaviors (ITEB-Q subscales) within and across all study time points.

Regression analyses: Predictive models (see Fig. 1 for summary of model results).

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[2] We were not able to collect information about household income in this study. Demographic information was reported by participating youths, who may be unlikely to know their family's annual income. Thus, maternal education level, school type, and ethnicity serve as our metrics of socioeconomic status in this study.

Table 2 Zero-order correlations between study variables across Time 1 (T1), Time 2 (T2), and Time 3 (T3)

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. SDQ T1	–	−.54**	−.56**	−.49**	.74**	−.26*	−.26*	−.25*	.75**	−.47**	−.47**	−.46**
2. ITEB-Q feelings T1		–	.92**	.81**	−.43**	.46**	.45**	.43**	−.48**	.59**	.54**	.53**
3. ITEB-Q thoughts T1			–	.91**	−.38**	.43**	.46**	.43**	−.42**	.58**	.55**	.57**
4. ITEB-Q behavior T1				–	−.32*	.43**	.48**	.47**	−.37**	.54**	.49**	.57**
5. SDQ T2					–	−.30*	−.29*	−.23*	.86**	−.39**	−.37**	−.34**
6. ITEB-Q feelings T2						–	.92**	.73**	−.25*	.49**	.54**	.51**
7. ITEB-Q thoughts T2							–	.88**	−.26*	.48**	.53**	.53**
8. ITEB-Q behavior T2								–	−.29*	.39**	.42**	.44**
9. SDQ T3									–	−.47**	−.45**	−.42**
10. ITEB-Q feelings T3										–	.92**	.88**
11. ITEB-Q thoughts T3											–	.96**
12. ITEB-Q behaviors T3												–

SDQ Strengths and Difficulties Questionnaire, *ITEB-Q* Implicit Thoughts, Emotions, and Behaviors Questionnaire

* $p < .05$; ** $p < .01$

Fig. 1 Summary of hierarchical linear regression results: competing predictive models
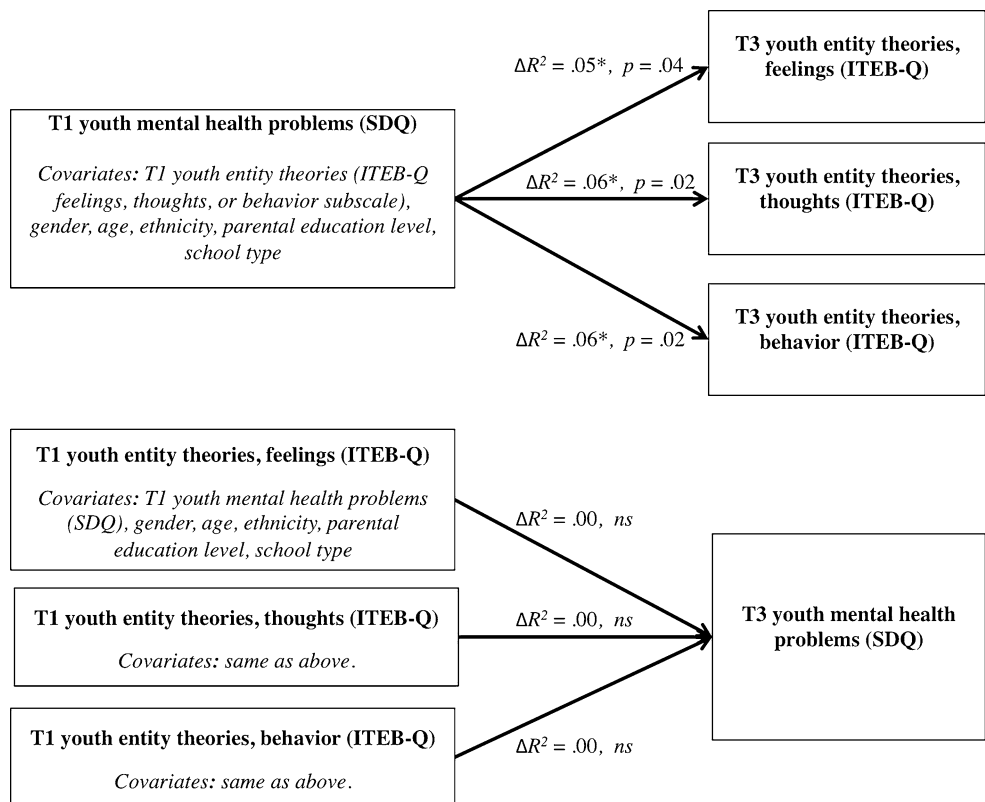
Do T1 entity theories of thoughts, feelings, and behavior predict increases in youth mental health problems? To test whether T1 levels of implicit theories predicted change in early adolescents' mental health problems, we conducted two hierarchical linear regression models. The first model tested predictive relations between variables from T1 to the 3-month assessment point, and the second, from T1 to the 6-month assessment point. Results of these models are detailed in Table 3. T1 entity theories of thoughts, feelings, and behavior did not predict increases in total youth problems across 3- or 6-month periods, over and above demographic factors

Table 3 Hierarchical linear regression analyses testing baseline implicit theories of thoughts, feelings, and behavior (ITEB-Q subscales) as predictors of total youth problems (SDQ scores) across 3 and 6 months, controlling for demographic factors

Predictor (Step 2 variable)	Dependent variable					
	T3 SDQ (6 months)		T3 SDQ (6 months)		T3 SDQ (6 months)	
	β	ΔR^2	β	ΔR^2	β	ΔR^2
		.00		.00		.00
Step 1						
T1 total youth problems	.73**		.76**		.75**	
Youth gender	.09		.08		.08	
youth age	.22		.22		.24	
Maternal education level	−.19		−.19*		−.18	
School type (public vs. private)	−.19		-.19		−.19	
Caucasian	.29		.27		.27	
African American	.08		.06		.07	
Asian American	.06		.06		.05	
Hispanic	.29		.28		.29	
Other	.19		.17		.18	
Step 2						
Baseline ITEB-Q (implicit theories)	−.06 (feelings)		−.01 (thoughts)		−.04 (behavior)	
Predictor (Step 2 variable)	**Dependent variable**					
	T2 SDQ (3 months)		T2 SDQ (3 months)		T2 SDQ (3 months)	
	β	ΔR^2	β	ΔR^2	β	ΔR^2
		.00		.00		.00
Step 1						
T1 total youth problems	.78**		.81**		.80**	
Youth gender	.05		.06		.05	
Youth age	.19		.19		.19	
Maternal education level	−.16		−.16		−.16	
School type (public vs. private)	−.21		−.21		−.21	
Caucasian	.66		.64		.65	
African American	.42		.40		.41	
Asian American	.20		.18		.19	
Hispanic	.44		.42		.43	
Other	.58		.57		.58	
Step 2						
Baseline ITEB-Q (implicit theories)	−.01 (feelings)		.03 (thoughts)		.02 (behavior)	

* $p < .05$; ** $p < .01$

(age, gender, ethnicity, school type, and maternal education level), $R^2 = .00$, $p > .05$.

Do T1 mental health problems predict increases in entity theories of thoughts, feelings, and behavior? To test whether T1 levels of mental health problems predicted changes in implicit theories of thoughts, feelings, and behaviors, we conducted two additional hierarchical linear regression models. Results of these models are shown in Table 4. T1 youth mental health problems predicted

changes in implicit theories, as measured by the ITEB-Q, over and above demographic factors. Specifically, higher total problems at T1 predicted greater increases in entity theories of feelings over the full study period from fall to spring, $R^2 = .05$, $F(1, 49) = 4.32$, $p = .04$, 95 % CI [−.30, −.01]. Similarly, higher total problems at T1 total problems predicted greater increases in entity theories of thoughts, $R^2 = .06$, $F(1, 49) = 5.20$, $p = .02$, 95 % CI [−.31, −.02], and behavior, $R^2 = .06$, $F(1, 49) = 5.75$,

Table 4 Hierarchical linear regression analyses testing baseline total youth problems (SDQ) as a predictor of entity theories of thoughts, feelings, and behavior (ITEB-Q) across 3 and 6 months controlling for demographic factors

Predictor (Step 2 variable)	Dependent variable					
	T3 ITEB-Q, feelings (6 months)		T3 ITEB-Q, thoughts (6 months)		T3 ITEB-Q, behavior (6 months)	
	β	ΔR^2	β	ΔR^2	β	ΔR^2
Step 1		.05*		.06*		.06*
T1 ITEB-Q (implicit theories of feelings, thoughts, or behavior)	.38**		.32**		.34**	
Youth gender	−.27*		−.26*		−.29*	
Youth age	.16		.12		.12	
Maternal education level	.12		.09		.05	
School type (public vs. private)	−.71		−.38		−.19	
Caucasian	−.40		−.03		−.28	
African American	−.13		−.11		.05	
Asian American	−.05		−.22		−.12	
Hispanic	−.19		−.10		−.12	
Other	−.10		−.19		−.09	
Step 2						
Baseline total youth problems	−.27*		−.29*		−.29*	
Predictor (Step 2 variable)	**Dependent variable**					
	T2 ITEB-Q, feelings (3 months)		T2 ITEB-Q, thoughts (3 months)		T2 ITEB-Q, behavior (3 months)	
	β	ΔR^2	β	ΔR^2	β	ΔR^2
Step 1		.00		.00		.01
T1 ITEB-Q (implicit theories of feelings, thoughts, or behavior)	.50**		.43**		.47**	
Youth gender	−.11		−.16		−.05	
Youth age	−.32		−.51		−.57	
Maternal education level	.11		.15		.12	
School type (public vs. private)	.12		.25		.41	
Caucasian	−.57		−.56		−.52	
African American	−.19		−.17		−.07	
Asian American	−.03		−.01		−.10	
Hispanic	−.48		−.45		−.31	
Other	−.32		−.32		−.34	
Step 2						
Baseline total youth problems	.06		.01		.11	

* $p < .05$; ** $p < .01$

$p = .02$, 95 % CI [−.30, −.03], across this period. None of these predictive relations were significant over the shorter period from fall to winter, $R^2 = .00$, $p > .05$.

Do specific kinds of youth problems predict increases in entity theories? Because T1 mental health problems predicted increases in entity theories as measured by the ITEB-Q over the school year from fall to spring, we conducted additional regression analyses to test whether these findings were specific to either of the two kinds of mental health problems on which this study was focused: internalizing (emotional problems in the SDQ) and externalizing (conduct problems in the SDQ). T1 emotional problems predicted greater increases in entity theories of behavior, $R^2 = .05$, $F(1, 49) = 4.29$, $p = .04$, 95 % CI [−.61, −.01], thoughts, $R^2 = .06$, $F(1, 49) = 5.27$, $p = .03$, 95 % CI [−.71, −.05], and feelings, $R^2 = .04$, $F(1, 49) = 4.42$,

$p = .04$, 95 % CI [−.61, −.01], across the full study period from Fall to Spring. However, T1 conduct problems only marginally predicted increases in thoughts, $R^2 = .05$, $F(1, 49) = 3.95$, $p = .05$, 95 % CI [−.98, .01], and behavior, $R^2 = .04$, $F(1, 49) = 3.91$, $p = .05$, 95 % CI [−.91, .01], and did not predict changes in entity theories of feelings. As predicted, T1 hyperactivity, peer problems, and prosocial behavior did not significantly or marginally predict changes in entity theories of thoughts, feelings, or behavior across the school year.

Discussion

Entity theories of personal traits have shown significant relations with mental health problems in youths [12]. Typically, this association is interpreted as suggesting that entity theories across domains likely predict increases in youth mental health problems [13, 14], rather than the alternate possibility that mental health problems may predict increases in certain kinds of entity theories. Further, prior research on implicit theories has focused largely on youths' achievement and motivation rather than mental health [59], and few studies on implicit theories and youth mental health have assessed these variables' longitudinal relations [12]. The present study helps fill these gaps, testing competing models of relations between early adolescents' mental health and implicit theories of thoughts, feelings, and behavior over time. Consistent with prior research, findings supported substantial, concurrent associations between stronger entity theories of thoughts, feelings, and behavior and greater mental health problems in youths, at all three study assessment points. Findings also shed light on the relative plausibility of the two predictive models discussed in the introduction. Specifically, greater mental health problems—especially internalizing problems—prospectively predicted increases in entity theories of thoughts, feelings, and behavior over the course of the school year; however, findings did not support T1 entity theories as predictors of increased mental health problems.

This set of findings runs counter to conceptualizations of entity theories' relation to mental health. That is, studies have typically framed entity theories spanning many domains as potential *causes* of mental health problems rather than as a possible *consequence* of such problems [13, 60]. However, the directionality observed here seems theoretically plausible, especially in relation to entity theories of thoughts, feelings, and behavior: youths struggling with psychiatric problems that they are unable to overcome might understandably experience their troubling thoughts, feelings, and behaviors as very difficult to change. Repeated failure of their efforts to change might lead them to conclude that these distressing aspects of themselves are

fixed and unchangeable, establishing ever stronger entity theories over time. Although observed effects were modest (T1 psychopathology accounted for 6 % of variance in entity theories 6 months later), findings suggest that the development of psychopathology might partially account for the emergence of entity theories of thoughts, feelings, and behavior during early adolescence—a period in which psychopathology tends to emerge at especially high rates.

Some trends also emerged regarding the types of youth problems that might best predict entity theories of thoughts, feelings, and behavior. When assessed individually, the only SDQ subscale to significantly predict these entity theories was the 'emotional problems' subscale, which taps symptoms of depression and anxiety. This pattern seems to fit with the kinds of symptoms that characterize internalizing disorders in youths, especially in comparison to externalizing problems. Both anxiety and depression are characterized by negative cognitive biases: youths with these problems tend to perceive their environments as out of their control [26], selectively attend to negative emotions and potential threat [61], and attribute life events to stable, internal, and global causes [62]. Youths with conduct and behavioral problems do not present as consistently with these kinds of biases. Moreover, youths with conduct problems are less likely to be distressed by their problems than youths with more internalizing problems; indeed, distress may sometimes be experienced more often by the caregivers, teachers, and peers of externalizing youths than by the youths themselves [63]. Thus, it follows that symptoms of internalizing disorders, in particular, would exacerbate maladaptive beliefs such as viewing thoughts, feelings, and behavior as unalterable. In future studies, more extensive assessments of both anxiety and depressive symptoms might clarify which kinds of internalizing problems best predict, or are best predicted by, entity theories of thoughts, feelings, and behavior across early adolescence.

Findings also underscore the value of examining reciprocal relations between entity theories of thoughts, feelings, and behavior and youth mental health over time. Prior research on implicit theories and youth mental health has been largely cross-sectional, leaving directionality of links between these variables largely unexplored. One exception is a study by Jones et al. [32], which identified entity theories of intelligence as both a predictor and an outcome of achievement in high school students. In line with this finding, the present study provides initial evidence that implicit theories may, in some cases, be a product of youth problems: higher levels of mental health problems predicted increases in entity theories of thoughts, feelings, and behavior across 6 months. Findings also suggest that increases in entity theories and increases in mental health problems are prospectively associated with one another.

Thus, while present data more strongly support youth problems as predicting certain kinds of entity theories, it remains plausible that youth problems and these theories relate cyclically, with each factor amplifying vulnerability generated by the other. This possibility is important to consider given prior findings that entity theories of intelligence predicted increases in depressive symptoms [13], that entity theories of personality predicted increases in aggressive desires [46], and that entity theories of intelligence have related cyclically with youth achievement [32]. Within a cyclical prediction model, youths with elevated mental health problems might experience greater difficulty in controlling their feelings, thoughts, and behavior, perhaps due to emotion regulation or impulse control difficulties associated with mental health concerns. In turn, these youths might come to view thoughts, feelings, and behavior as fixed and uncontrollable, increasing hopelessness and exacerbating pre-existing psychopathology. The fact that mental health problems predicted increases in entity theories from fall to spring but *not* across the shorter period from fall to winter, in this study, suggests that these predictive processes may take time to unfold; it would not be surprising if this unfolding process continues beyond the time frame of a single school year. A study like ours, with three assessment points within a single school year is certainly limited in its ability to fully test for cyclical relations between mental health problems and the entity theories of interest. However, the finding that these variables were significantly associated with one another at each of the three study assessment points suggests the possible merit of further research on this question. Future studies with more assessments across more elapsed time could enrich our understanding significantly.

Although present findings suggest a different theoretical model than is typically proposed, they are not necessarily in conflict with existing evidence identifying implicit theories in certain domains as prospective predictors of youth mental health problems. Evidence suggests that implicit theories in different domains are conceptually distinct from one another [24]. Thus, different kinds of theories may relate to youth mental health problems in different ways. For instance, youths experiencing depression or anxiety are likely to experience ongoing difficulty controlling their own symptoms, despite continued effort. These experiences may *specifically* undermine their beliefs in the malleability of thoughts, feelings, and behavior, as these are the domains in which psychopathology interferes most directly. Thus, while entity theories of intelligence and personality might more typically precede and predict increases in mental health problems, mental health problems themselves may foster the emergence of entity theories in separate domains – namely, thoughts, feelings, and behavior.

Our findings may also carry specific implications for the design and focus of interventions to reduce risk and psychopathology. The study suggests the possibility that youth mental health problems may lead to the development of entity theories of thoughts, feelings, and behavior over time, but it provides no support for the reverse developmental pattern. Thus, while targeting implicit theories of intelligence or personality has shown promise as a strategy for preventing youth problems, this approach may not apply to implicit theories of thoughts, feelings, and behavior. Rather, interventions targeting these particular theories might be especially helpful to youths already experiencing psychopathology, who may be likely to view their thoughts, emotions, and actions as increasingly unchangeable over time. Such efforts might help prevent further problems in youth development, spanning academic and motivational domains, among youths in this vulnerable population. However, in considering this possibility, it is notable that this study used a community youth sample. It is unclear whether implicit theories and mental health problems would show the same pattern of relations among clinic-referred youth samples. Future research examining implicit theories among youths experiencing more severe anxiety, depression, or behavioral problems will help test the viability of these kinds of approaches.

This study has limitations that warrant mention and suggest directions for future research. First, although our study was sufficiently powered for the statistical tests employed, and significant findings emerged suggesting medium-to-large effect sizes, the sample size limited our ability to conduct other theoretically useful tests to assess bidirectional relations between implicit theories of interest and mental health, such as cross-lagged panel analyses and growth curve models. Studies with larger samples using these techniques might be better positioned to examine fine-grained, smaller effects. That said, interpretability of the tests we did conduct was enhanced by the total absence of attrition in the study at each measurement point; this means that the findings can be considered fully representative of the initially identified sample. Another limitation was our use of youth reports in assessing youth problems. It is notable that virtually all existing studies examining associations between youth mental health problems and implicit theories have relied on a single-informant, youth-report designs [12], but obtaining youth problem reports from multiple perspectives (e.g. parents, teachers) would provide valuable evidence on the robustness of findings across informants. Our use of a community sample could also be viewed as a limitation; in the future it would be useful to examine the same study questions among clinic-referred youths. Finally, the study's measurement model did not include extensive assessments of specific kinds of youth problems, such as depression, aggression, or anxiety.

The SDQ subscales (5 items each) are limited in their ability to detect the presence of specific youth problems compared to more comprehensive self-report measures. In future studies, assessing a broader array of youth problems in more depth might clarify which kinds of problems best predict, or are predicted by, entity theories during early adolescence.

Summary

Despite these limitations, results revealed strong, temporally stable associations between entity theories of thoughts, feelings, and behaviors and mental health problems in early adolescents. Further, findings supported a predictive model that runs counter to prevailing assumptions about relations between mental health and previously studied implicit theories: T1 levels of mental health problems predicted (rather than being predicted *by*) subsequent increases in entity theories of thoughts, feelings, and behavior. Taken together, these findings suggest prospective, dynamic relations between mental health and implicit theories of thoughts, feelings, and behavior in early adolescence. More expansive prospective studies with youths and families, parsing cross-sectional, predictive, and potentially reciprocal links between these implicit theories and youth mental health may enrich our understanding of the developmental processes involved, and inform the development of interventions to treat and prevent a range of youth problems.

Appendix

Implicit Thoughts, Emotions and Behavior Questionnaire items (respondents select *Very False*, *False*, *Somewhat False*, *Somewhat True*, *True*, or *Very True*, depending on the extent to which they agree with each statement):

1. When you try, you can change the feelings you have.
2. When you feel bad, you can make yourself feel better.
3. You control the feelings you have.
4. Even if you usually feel a certain way, you can change the feelings you have.
5. You can change what you think, if you try.
6. When you don't like the thoughts you have, you can change them.
7. Even if you usually think in a certain way, you can change the thoughts you have.
8. You can change your thoughts if you don't like them.
9. You can change how you behave if you really try.
10. You can always choose how you behave.
11. If you put your mind to it, you can control how you behave.
12. Even if you usually behave in a certain way, you can change your behavior.

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