Self-Fulfilling Prophecy Effects of Mothers' Beliefs on Children's Alcohol Use: Accumulation, Dissipation, and Stability Over Time

Stephanie Madon, Jennifer Willard, Max Guyll, Linda Trudeau, and Richard Spoth
Iowa State University

This research examined whether self-fulfilling prophecy effects accumulated, dissipated, or remained stable over time in terms of 2 complementary conceptual models. Analyses of longitudinal data from 2 samples of mother–child dyads ($N_1 = 487$; $N_2 = 288$) yielded 3 main findings. First, the degree to which mothers' inaccurate beliefs assessed at a single point in time predicted children's distal alcohol use did not differ from the degree to which they predicted children's proximal alcohol use, thereby supporting a pattern of stability for the samples on average. Second, mothers' inaccurate beliefs repeatedly assessed across time had additive self-fulfilling effects on their children's subsequent alcohol use assessed at a single later point in time. Third, these additive self-fulfilling effects served to exacerbate differences in the alcohol use of children who had been consistently exposed to unfavorable versus favorable beliefs year after year. The authors discuss these findings in terms of the link between self-fulfilling prophecies and social problems.

Keywords: self-fulfilling prophecies, accumulation, drinking behavior, parent–child relations

A core theme in the social psychological literature is that perceivers can shape targets' future outcomes through the process of a self-fulfilling prophecy (for reviews, see Jones, 1986; Jussim, 1986; Jussim, Eccles, & Madon, 1996; Snyder, 1984, 1992; Snyder & Stukas, 1999). A self-fulfilling prophecy occurs when a perceiver's inaccurate belief about a target initiates a sequence of events that ultimately causes the target to exhibit expectancy-consistent behavior, thereby causing the initially false belief to come true (Merton, 1948). Although self-fulfilling prophecy effects have historically been characterized as powerful (for a review, see Jussim, 1991), naturalistic research has found that such effects are typically modest in magnitude (e.g., Jussim, 1991; Jussim & Eccles, 1995; Jussim et al., 1996). However, this does not mean that self-fulfilling prophecy effects can never be powerful.

Psychological theory has long hypothesized that self-fulfilling prophecy effects may accumulate over time, which, if true, could cause effects that are small within a relatively short period of time (e.g., 1 year) to become more powerful over longer periods of time (e.g., 6 years). Indeed, this is one of the processes by which self-fulfilling prophecies are thought to generate and perpetuate inequalities (for reviews, see Jussim et al., 1996; Klein & Snyder, 2003; Snyder, 1992; Snyder & Stukas, 1999). According to this perspective, the accumulation of self-fulfilling prophecy effects over time puts targets on trajectories that increasingly benefit some while increasingly harming others, thereby widening the gap between advantaged and disadvantaged individuals and groups over the course of time (for reviews, see Jussim et al., 1996; Klein & Snyder, 2003; Snyder & Stukas, 1999; see Steele, 1997, for a related process). However, to date there have been only three studies that have tested this hypothesis (i.e., Rosenthal & Jacobson, 1968; Smith, Jussim, & Eccles, 1999; West & Anderson, 1976),[1] and these studies yielded mixed findings. In the current research, therefore, we revisit the hypothesis that self-fulfilling prophecy effects accumulate over time and consider two different processes through which such effects might materialize—one that was examined in the three existing studies and a second that we introduce in this article. In addition, whereas the three existing studies all examined the accumulation of self-fulfilling prophecy

[1] Two other studies are often cited as investigations of long term self-fulfilling prophecy effects (Frieze, Olson, & Russell, 1991; Rist, 1970). However, because these studies did not assess perceivers' beliefs, neither provide a clear test of the relevant processes. Interested readers are referred to the source articles and to broad reviews of the expectancy literature (Jussim et al., 1996; Jussim & Harber, 2005; Snyder & Stukas, 1999).

effects over time in the context of the teacher–student relationship, we examine it in a novel context: among mothers and their adolescent children, in which children's alcohol use is the outcome variable.

Long-Term Self-Fulfilling Prophecy Effects: Accumulation, Dissipation, and Stability Over Time

The accumulation of self-fulfilling prophecy effects over time is a process whereby the magnitude of an individual perceiver's self-fulfilling effect becomes successively stronger as time passes. Accumulation over time can occur if an inaccurate belief held by a perceiver at one point in time has a stronger self-fulfilling effect on a target's distal outcome than it has on the target's proximal outcome (Rosenthal & Jacobson, 1968; Smith et al., 1999; West & Anderson, 1976). For example, the inaccurate belief that a teacher holds about a student's ability at the beginning of the school year may have a stronger self-fulfilling effect on the student's year-end achievement than it had on the student's midyear achievement. Accumulation over time can also occur if the inaccurate beliefs held by an individual perceiver at different points in time have additive self-fulfilling effects on a target's subsequent outcome. For example, the inaccurate beliefs that a mother holds about her child's alcohol use in the seventh and eighth grades may each contribute to her child's ninth-grade alcohol use through each belief's independent self-fulfilling effect. Accumulation over time may arise when a perceiver's inaccurate belief puts a target on a trajectory that influences the target's future behavior (Smith et al., 1999) and when subsequently developed beliefs are of the same valence as the initially false belief (e.g., all favorable or all unfavorable; Jussim et al., 1996; Smith et al., 1999).

Of course, self-fulfilling prophecy effects need not necessarily accumulate over time. They may also dissipate or remain stable. Dissipation over time is a process whereby the magnitude of an individual perceiver's self-fulfilling effect becomes successively smaller as time passes. Dissipation over time can occur if an inaccurate belief held by a perceiver at one point in time has a weaker self-fulfilling effect on a target's distal outcome than it has on the target's proximal outcome, such as when a teacher's inaccurate belief developed early in the school year elicits less confirmatory behavior from a student at each subsequent marking period (Smith et al., 1999; West & Anderson, 1976). Dissipation over time may also occur if the inaccurate beliefs developed by a

perceiver about a target at different points in time work against one another's self-fulfilling effects by virtue of having different valences (e.g., Jussim et al., 1996; Smith et al., 1999). Dissipation over time may occur if a target's tendency to regress to the mean overpowers a perceiver's self-fulfilling effect (Smith et al., 1999) and when a target becomes less susceptible to confirming perceivers' inaccurate beliefs as time passes, such as if the target's self-concept becomes clearer over time (Swann & Ely, 1984).

Stability over time is a process whereby the magnitude of an individual perceiver's self-fulfilling effect remains relatively constant across time. For example, a teacher may raise a student's achievement from average to above average through a self-fulfilling prophecy, and this change may be sustained over the next several grades with the student showing neither academic declines nor improvements during this time. Stability over time may arise if a perceiver's initially inaccurate belief permanently changes a target's behavior, when a perceiver's initial self-fulfilling effect leads to floor or ceiling effects in a target's behavior that reduce the likelihood of further behavioral changes, or when subsequent beliefs maintain a previous self-fulfilling prophecy effect without themselves eliciting confirmatory behavior (Smith et al., 1999). We collectively refer to the processes of accumulation, dissipation, and stability over time as *long-term self-fulfilling prophecy effects* because they reflect processes that occur across multiple time frames.

Single Belief Model

Theoretical and empirical work have considered long-term self-fulfilling prophecy effects as the effect of a perceiver's inaccurate belief assessed at one point in time on a target's outcome assessed repeatedly across time (e.g., Jussim et al., 1996; Rosenthal & Jacobson, 1968; Smith et al., 1999; West & Anderson, 1976). We refer to this as the *single belief model* because it reflects a process whereby the self-fulfilling effect associated with a single inaccurate belief becomes stronger (i.e., accumulates), weaker (i.e., dissipates), or remains stable over time. Figure 1 presents the single belief model for a target's outcome assessed at two points in time. The self-fulfilling effect of a perceiver's inaccurate belief on the target's outcome equals a for the proximal outcome and equals $b + ac$ for the distal outcome. Path c corresponds to the stability in the target's outcome over time. Accumulation over time corresponds to the perceiver's inaccurate belief relating more strongly
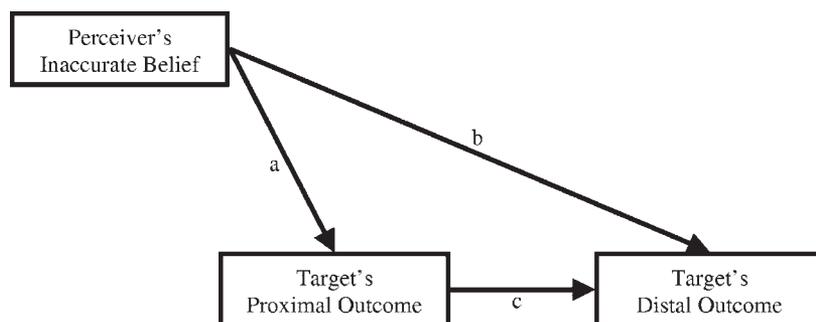

Figure 1. Single belief model. This is a longitudinal model in which a single assessment of a perceiver's inaccurate belief temporally precedes repeated assessments of a target's outcome.

to the target's distal outcome than to the target's proximal outcome (i.e., $b + ac > a$). Dissipation over time corresponds to the perceiver's inaccurate belief relating less strongly to the target's distal outcome than to the target's proximal outcome (i.e., $b + ac < a$). Stability over time corresponds to the perceiver's inaccurate belief relating as strongly to the target's distal outcome as to the target's proximal outcome (i.e., $b + ac = a$).

A common misperception of the single belief model is that it underestimates the total self-fulfilling prophecy effect that occurs over time because it does not include the self-fulfilling effects of other (unmeasured) inaccurate beliefs. For example, consistent with the process of accumulation over time, the inaccurate beliefs that parents hold about their children's alcohol use in the seventh grade may increasingly elicit confirmatory behavior from their children year after year up through high school. However, parents will no doubt hold additional beliefs as well in the years after the initial belief and prior to the ultimate outcome. To the extent that these additional beliefs are also inaccurate, each has the potential to have its own self-fulfilling effect. Because the single belief model does not explicitly include these subsequent inaccurate beliefs, one might assume that their self-fulfilling effects are being completely overlooked. However, as detailed by Jussim et al. (1996, pp. 367–370), the total effect of a measured belief on a distal outcome (i.e., $b + ac$; Figure 1) includes the effect of all unmeasured beliefs to the extent that the unmeasured beliefs correlate with, or are predicted by, the measured belief. In terms of the previous example, this means that the total self-fulfilling effect of parents' seventh-grade beliefs on children's alcohol use in high school includes the self-fulfilling effects of their later inaccurate beliefs (e.g., at eighth grade, at ninth grade, etc.) to the extent that parents' later beliefs are predicted by their seventh-grade beliefs. Thus, even though the single belief model explicitly includes beliefs assessed at only one point in time, it nonetheless captures the self-fulfilling effects of all unmeasured beliefs to the extent that the unmeasured and measured beliefs are correlated.

Repeated Belief Model

A second process by which self-fulfilling prophecy effects can accumulate, dissipate, or remain stable over time that has not been explicitly conceptualized in the literature pertains to the combined effects of multiple inaccurate beliefs—each assessed at a different point in time—on a target's outcome assessed at a single later

point in time. We refer to this as the *repeated belief model* because it reflects a process whereby multiple inaccurate beliefs held by an individual perceiver at different points in time combine to have stronger (i.e., accumulating), weaker (i.e., dissipating), or stable self-fulfilling effects on a target's outcome assessed at a single later point in time. Figure 2 presents the repeated belief model for a perceiver's inaccurate belief assessed repeatedly at two points in time. The self-fulfilling effect of the perceiver's earlier inaccurate belief on the target's subsequent outcome equals $a + bc$. The self-fulfilling effect of the perceiver's later inaccurate belief on the target's subsequent outcome equals b. Path c corresponds to the stability in the perceiver's beliefs over time.

In our presentation of the single belief model, we explained that a perceiver's inaccurate belief assessed at one point in time captures the self-fulfilling effects of all unmeasured beliefs to the extent that the unmeasured beliefs are predicted by the measured belief (Jussim et al., 1996). With respect to the repeated belief model, this raises the question of how later beliefs can produce additional self-fulfilling prophecy effects beyond beliefs assessed earlier in time. The answer is that the repeated belief model considers the potential for self-fulfilling prophecy effects to accumulate, dissipate, or remain stable over time as a result of independent self-fulfilling prophecy effects produced by those portions of later beliefs that are not predicted by an earlier belief. For example, the inaccurate beliefs that parents hold about their children's alcohol use in the seventh grade may not perfectly predict the inaccurate beliefs that they hold about their children's alcohol use in the eighth and ninth grades. Moreover, the unpredicted portions of parents' later beliefs (i.e., at eighth and ninth grades) can have their own independent self-fulfilling effects on their children's subsequent alcohol use. It is precisely these independent effects—which are not captured by the single belief model—that are detected by the repeated belief model. Thus, the repeated belief model is sensitive to the fact that interpersonal beliefs may change in unpredictable ways over the course of an enduring relationship and that the unpredictable portions of perceivers' later beliefs may each themselves have self-fulfilling effects that are not accounted for by previously held beliefs.

By virtue of considering the self-fulfilling effects of these unpredicted portions of perceivers' later beliefs, the repeated belief model reveals how self-fulfilling prophecy effects may simultaneously accumulate, dissipate, or remain stable over time for
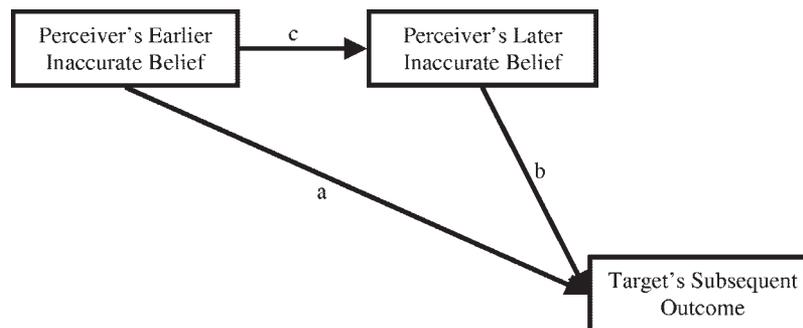

Figure 2. Repeated belief model. This is a longitudinal model in which repeated assessments of a perceiver's inaccurate belief temporally precede a single assessment of a target's outcome.

different targets, depending on the particular combination of inaccurate beliefs to which each is exposed over time. The model depicted in Figure 2 would simultaneously support the processes of accumulation, dissipation, and stability over time if the inaccurate beliefs that a perceiver holds about a target at different points in time each exert their own independent self-fulfilling effect on the target's subsequent outcome (i.e., $a + bc > 0$ and $b > 0$). Accumulation over time can occur among targets who are consistently exposed to inaccurate beliefs that are of the same valence across time (e.g., favorable at both an earlier and later time point). Dissipation over time can occur among targets who are consistently exposed to inaccurate beliefs that are of different valences across time (e.g., favorable at an earlier time point and unfavorable at a later time point). Stability over time can occur among targets who are exposed to an earlier inaccurate belief that has a self-fulfilling effect followed by a later belief that is not self-fulfilling.

Comparison of Single Belief and Repeated Belief Models

At this point it is useful to compare and contrast the single belief and repeated belief models. The single belief model shows that, over time, the self-fulfilling prophecy effects associated with inaccurate beliefs assessed at one point in time can change in magnitude. That is, this model reveals whether self-fulfilling prophecy effects accumulate, dissipate, or remain stable over time for a sample on average and, thus, reflects nomothetic processes that pertain to general patterns. The repeated belief model, by contrast, captures the dynamic quality of interpersonal beliefs, recognizing that an individual perceiver's inaccurate beliefs can change over time and that a perceiver's later beliefs can each have their own independent self-fulfilling effect. Because the repeated belief model considers the unique self-fulfilling effect of perceivers' later beliefs, it reveals whether accumulation, dissipation, and stability are simultaneously occurring over time for different individuals within a sample, depending on the particular combination of inaccurate beliefs to which each is exposed over time. Accordingly, the repeated belief model reflects idiographic processes that take into account the pattern of inaccurate beliefs that an individual perceiver holds about a given target over time. As this comparison suggests, the single belief and repeated belief models are not in competition with one another, but rather provide distinct and complementary perspectives on long-term self-fulfilling prophecy effects.

Research on the Accumulation, Dissipation, and Stability of Self-Fulfilling Prophecy Effects Over Time

Although the idea that self-fulfilling prophecy effects may accumulate over time has important implications for understanding how self-fulfilling prophecies may contribute to social inequalities (for reviews, see Jones, 1986; Jussim et al., 1996; Klein & Snyder, 2003; Merton, 1948; Snyder & Stukas, 1999), there has been very little empirical research that has focused on long-term self-fulfilling prophecy effects. Of the three studies that do exist, all examined the processes of accumulation, dissipation, and stability over time from the perspective of the single belief model (Rosenthal & Jacobson, 1968; Smith et al., 1999; West & Anderson, 1976). Each study examined the relationship between teachers' inaccurate beliefs assessed at baseline (e.g., beginning of the

sixth grade) and students' outcomes repeatedly assessed at later points in time (e.g., both seventh- and eighth-grade achievement). The clearest pattern to emerge from these studies was that teachers' self-fulfilling effects tended to dissipate after students changed teachers to advance grade levels. This pattern supports the idea that social interaction mediates self-fulfilling prophecies (Rosenthal, 1973) and that declines in perceiver–target interactions reduce the potential for social influence.

Rosenthal and Jacobson (1968) and Smith et al. (1999) also tested for accumulation, dissipation, and stability over time among teachers and students within a single school year during which time social interaction between teachers and students remained high. However, whereas Rosenthal and Jacobson found that self-fulfilling prophecies accumulated over time, Smith et al. found that they dissipated over time. These mixed findings preclude definitive statements regarding the long-term self-fulfilling effect of a single inaccurate belief on repeated assessments of a target's outcome over the course of an enduring relationship and highlight the need for additional work examining this issue.

In contrast to the handful of studies that have tested for long-term self-fulfilling prophecy effects from the perspective of the single belief model, no research has ever used the conceptual framework of the repeated belief model to investigate long-term self-fulfilling prophecy effects. Thus, although it is possible that the inaccurate beliefs held by perceivers at different points in time may exacerbate differences between targets by virtue of having additive self-fulfilling effects, there does not yet exist any empirical research that has tested that hypothesis.

Overview of the Current Investigation

This research examines the accumulation, dissipation, and stability of self-fulfilling prophecy effects over time with data from two samples of mother–child dyads in which children's alcohol use is the outcome variable. One data set provides four waves of data from a sample of 487 mother–child dyads spanning the time that children were in the 7th to the 9th grades. The other data set provides five waves of data from a sample of 288 mother–child dyads spanning the time that children were in the 6th to the 12th grades. Previously published studies based on portions of these data (Madon, Guyll, Spoth, Cross, & Hilbert, 2003; Madon, Guyll, Spoth, & Willard, 2004) found that mothers had small but significant self-fulfilling effects on their children's alcohol use within a single time frame (e.g., 12 months) and that certain processes influenced the magnitude of those effects. Specifically, Madon et al. (2004) found that mothers' beliefs elicited more confirmatory behavior from their children when fathers' beliefs were similar in valence, a process referred to as synergistic accumulation. Madon et al. (2003) found that mothers' self-fulfilling effects were moderated by belief valence and children's self-esteem, findings that are consistent with self theories (Sedikides, Gaertner, & Yoshiyasu, 2003; Swann, 1987) and with research pertaining to the parent–child bond (Catalano & Hawkins, 1996).

The present research extends these previously published findings by examining issues relevant to long-term self-fulfilling prophecy effects. We first examined whether mothers' beliefs assessed at one point in time have stronger, weaker, or stable self-fulfilling effects on their children's subsequent alcohol use assessed repeatedly across time. These analyses tested for long-

term self-fulfilling prophecy effects by using the framework of the single belief model, which has been the focus of past research on long-term self-fulfilling prophecy effects (Rosenthal & Jacobson, 1968; Smith et al., 1999; West & Anderson, 1976). Second, we examined whether mothers' beliefs assessed repeatedly across time have stronger, weaker, or stable self-fulfilling effects on their children's subsequent alcohol use assessed at a single later point in time. These analyses tested for long-term self-fulfilling prophecy effects by using the framework of the repeated belief model, which has not previously been considered in any past research. Because we examined these processes with data sets that were acquired from two independent samples, this research also addresses the degree to which the findings are reliable.

Adapted Reflection–Construction Model

The reflection–construction model (Jussim, 1991) relates perceivers' beliefs to targets' future outcomes. Figure 3 depicts an adaptation of this model showing causal relations between mothers' beliefs and children's alcohol use. Because the data with which we examined these relations are correlational, when discussing our own data, we phrase our findings in terms of variables predicting rather than causing other variables.

Accuracy

The model proposes that valid predictors of adolescent alcohol use influence both children's future alcohol use (Path a) and mothers' beliefs about their children's alcohol use (Path b). Mothers' beliefs are considered accurate to the extent that they are predicted by these valid predictors. According to the model, therefore, the accurate portion of the relationship between mothers' beliefs and children's future alcohol use is entirely contained in the effect represented by Path a (Jussim, 1991).

Self-Fulfilling Prophecies

Only the inaccurate portion of a belief can be self-fulfilling (Merton, 1948). The model defines mothers' beliefs as being inaccurate to the extent that they are not based on the valid predictors of adolescent alcohol use. Because the accuracy-based portion of the zero-order relationship between mothers' beliefs and children's future alcohol use is entirely included in the effect represented by Path a, Path c represents the ability of the inaccurate portion of mothers' beliefs to influence children's future alcohol use by means of a self-fulfilling prophecy (Jussim, 1991).

Valid Predictors

The accurate estimation of mothers' self-fulfilling effects on children's future alcohol use depends on the quality of the valid predictors included in the model. The valid predictors used in this research were selected on the basis of an extensive body of research regarding precursors of alcohol use among adolescents, including family social class; parents' drinking behavior; children's gender; and children's reports of their perceptions of friends' alcohol use, perceived accessibility of alcohol, attitudes toward alcohol use, perceived norms for adolescent alcohol use, perception of global parenting, self-assessed likelihood of drinking alcohol in the future, and past alcohol use (for reviews, see Catalano & Hawkins, 1996; Gorsuch & Butler, 1976; Hawkins, Catalano, & Miller, 1992).

Method

Participants

Data were obtained from two longitudinal randomized–controlled intervention trials focusing on the prevention of adolescent substance use and other problem behaviors. These studies were titled the Capable Families and Youth Study (Spoth, Redmond, Trudeau, & Shin, 2002), referred to
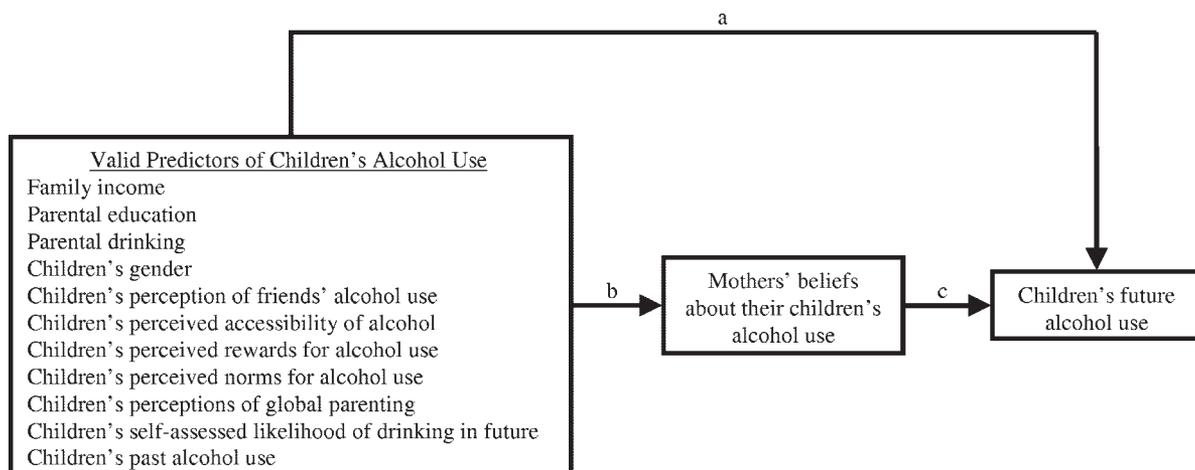
Figure 3. Adaptation of the reflection–construction model (Jussim, 1991). This model shows relations among valid predictors of children's alcohol use, mothers' beliefs about their children's alcohol use, and children's future alcohol use. According to the model, the valid predictors influence children's future alcohol use (Path a) and mothers' beliefs (Path b). Mothers' beliefs can also influence their children's future alcohol use through self-fulfilling prophecies (Path c).

subsequently as *Capable Families,* and the Rural Family and Community Drug Prevention Project (Spoth, Redmond, & Shin, 1998; Spoth, Reyes, Redmond, & Shin, 1999), referred to subsequently as *Rural Family*. Both studies sampled participants from the same Midwestern state. Analyses are based on four waves of data from 487 mother–child dyads who participated in Capable Families and on five waves of data from 288 mother–child dyads who participated in Rural Family. Only 1 child in each family provided data.

At Wave 1 in Capable Families, the mean age for mothers was 39 years, and the mean age for children was 12 years. There were 229 girls and 258 boys, including 474 European Americans, 2 African Americans, 3 Native Americans, 1 Asian American, 1 child whose ethnicity was categorized as "other," and 6 children for whom ethnicity was not reported. Children were enrolled in 36 schools in 22 contiguous counties in Iowa. Schools were selected on the basis of school lunch program eligibility (20% or more of households within 185% of the federal poverty level in the school district), school district size (1,200 or fewer), and having all middle school grades taught at a single location.

At Wave 1 in Rural Family, the mean age for mothers was 38 years, and the mean age for children was 12 years. There were 129 girls and 159 boys, including 280 European Americans, 1 African American, 1 Asian American, 1 Latino–Hispanic American, 2 children whose ethnicity was categorized as "other," and 3 children for whom ethnicity was not reported. Children were enrolled in 33 schools in 19 contiguous counties in Iowa. Schools were selected on the basis of school lunch program eligibility (15% or more district families eligible for free or reduced-cost lunches) and community size (8,500 or fewer).[2]

Procedures

Research staff verbally assessed demographic information and then administered written questionnaires to family members who completed them individually and in separate rooms of their residence. Participants were informed that their questionnaire responses were confidential and would not be communicated to other family members. In Capable Families, participants completed the questionnaires in the fall of 1998 while children were in the 7th grade (Wave 1) and then again at scheduled follow-ups approximately 6 (Wave 2, 7th grade), 18 (Wave 3, 8th grade), and 30 (Wave 4, 10th grade) months later. In Rural Family, participants completed the questionnaires in the spring of 1994 while children were in the 6th grade (Wave 1) and then again at scheduled follow-ups that occurred approximately 12 (Wave 2, 7th grade), 24 (Wave 3, 8th grade), 48 (Wave 4, 10th grade), and 72 (Wave 5, 12th grade) months later.[3]

Measures

The questionnaires assessed a large number of variables related to family, peers, and substance use. This research uses variables pertaining to mothers' beliefs about their children's alcohol use plus the following valid predictors of adolescent alcohol use: parents' reports of their family's social class and their own drinking behavior and children's reports of their gender, perceptions of friends' alcohol use, perceived accessibility of alcohol, attitudes toward alcohol use, perceived norms for adolescent alcohol use, perception of global parenting, self-assessed likelihood of drinking alcohol in the future, and past alcohol use. We next describe these variables in detail and provide average reliabilities across waves of data. Unless otherwise indicated, we used Cronbach's alpha to assess the internal consistency of the variables.

Mothers' beliefs.   Mothers' beliefs about their children's alcohol use were assessed with three items: (a) "On a scale of 1 to 10, please rate how likely you think it is that your child in the study will drink alcohol regularly as a teenager?" with anchors 1 (*certain that this will not happen*) and 10 (*certain that this will happen*); (b) "If your child in the study were at a party and one of his or her friends offered him/her an alcoholic beverage, how

likely would your child be to just say no and leave?" with anchors 1 (*very likely*) and 5 (*very unlikely*); and (c) "If your child in the study were at a party and one of his or her friends offered him/her an alcoholic beverage, how likely would your child be to drink it?" also with scale anchors 1 (*very likely*) and 5 (*very unlikely*). Responses to the third item were reverse scored. To combine responses into a single variable, we rescaled the 5-point scale responses into a 10-point scale format (i.e., $1 \rightarrow 1.00$; $2 \rightarrow 3.25$; $3 \rightarrow 5.50$; $4 \rightarrow 7.75$; $5 \rightarrow 10.00$) and then averaged responses to yield one score per child for each wave. Greater values reflect a mother's belief that her child is more likely to drink alcohol. The average reliability of the items across waves was .71 in both Capable Families and Rural Family.

Family social class.   Family social class was estimated with items that assessed family income and parental education. To assess family income, we asked parents to indicate their household's total pretax income, including wages, salaries, business income, dividends, interest, loans, gifts of money, and all forms of government assistance obtained by any member of the household. To assess parental education, we asked parents to verbally report the highest educational level or degree they had achieved. Responses were assigned a value of 0 through 20 (e.g., 0 = *no education*; 12 = *high school diploma or general equivalency diploma*; 16 = *bachelor's degree*; 18 = *master's degree*; 20 = *PhD, MD, etc.*). Across both samples, 96% of parents had completed high school or its equivalent. In the case of dual-parent households, parents' responses for income were averaged at each wave, as were parents' responses for education.

Parental drinking.   Two variables assessed parental drinking: parental drinking status and amount of parental drinking. Parental drinking status was assessed through parents' responses to the item "Did you drink any alcohol during the past 12 months?" (0 = *no*; 1 = *yes*). In the case of dual-parent households, responses to this question were coded as 0 if both parents answered "no" and were coded as 1 if one or both parents answered "yes." At Wave 1, 10% of households in Capable Families and 29% of households in Rural Family reported no parental drinking in the past year. Amount of parental drinking was measured with three items that assessed the frequency with which parents consumed different amounts of alcohol during the past month. These items included the following: (a) "How many days this past month did you have four or more alcoholic drinks on the same day?"; (b) "How many days this past month did you have only two or three alcoholic drinks on the same day?"; and (c) How many days this past month did you have only one alcoholic drink?" We combined parents' responses to these three items to create a single value reflecting the total number of alcoholic drinks consumed during the past month. For dual-parent households, the total number of alcoholic drinks consumed by mothers and fathers was averaged to yield one score per child. At Wave 1,

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[2] Families were assigned to one of three experimental conditions, depending on the school attended by the participating child. In Capable Families, the conditions were (a) the Life Skills Training Program, (b) the Life Skills Training Program in combination with the Strengthening Families Program for Parents and Youth 10–14, and (c) a no-treatment control condition. In Rural Family, the conditions were (a) Preparing for the Drug Free Years, (b) the Iowa Strengthening Families Program, and (c) a no-treatment control condition. For details about these interventions, see Botvin (2000); Hawkins et al. (1988); Molgaard, Kumpfer, and Fleming (1997); and Park et al. (2000).

[3] Rural Family also included a baseline assessment that occurred in the fall of 1993, approximately 6 months prior to what is labeled as Wave 1 in this article. Because the baseline assessment did not include a measure of mothers' beliefs, it did not provide the necessary data to test for self-fulfilling prophecy effects and is not further discussed. However, the reader should be aware that Waves 1, 2, 3, 4, and 5 in this article correspond to what actually were the 2nd, 3rd, 4th, 5th, and 6th assessments in the larger study.

the amount of parental drinking in the past month ranged from 0 to 123 in Capable Families and from 0 to 75 in Rural Family.

Children's perception of their friends' alcohol use. Capable Families and Rural Family used different items to assess alcohol use among a child's circle of friends. In Capable Families, children's perception of their friends' alcohol use was assessed with two items: (a) "How many of your friends do you think drink alcoholic beverages?" and (b) "How many of your friends do you think get drunk at least once a week?" Both items used a 5-point response scale with anchors 1 (*none*) and 5 (*all*). Responses were averaged to create one score for each child per wave. The average reliability of the items across waves was .69. In Rural Family, children's perception of their friends' alcohol use was assessed by asking children "During the past month, how many of your close friends have drunk beer, wine, wine coolers, or liquor?" Children made their responses on a 5-point scale with anchors 1 (*none of them*) and 5 (*all of them*). In both samples, higher values indicate more perceived alcohol use among friends.

Children's perceived accessibility of alcohol. To assess children's ability to access alcohol, we asked children to respond to the following question: "If you had the money and wanted to get beer, wine, or liquor, do you think you could get some?" Children responded on a 4-point scale with anchors 1 (*definitely yes*) and 4 (*definitely no*). Responses were reverse scored so that higher values correspond to greater perceived ability to obtain alcohol.

Children's attitudes toward alcohol use. Children's attitudes regarding both positive and negative consequences of alcohol use were assessed with five items that followed the question stem "Do you think . . . ": (a) it is easier to open up and talk about one's feelings after a few drinks of alcohol; (b) drinking alcohol makes people happier with themselves; (c) people make fools of themselves after a few drinks of alcohol; (d) drinking alcohol gets in the way of schoolwork; and (e) drinking alcohol makes it hard to get along with friends. Responses were assessed with a 4-point scale with anchors 1 (*definitely yes*) and 4 (*definitely no*) and reversed scored as necessary. The average reliability across waves of data was .65 in Capable Families and .67 in Rural Family. Responses were averaged to create one score per child at each wave. Higher values reflect greater perceived rewards for drinking alcohol.

Children's perceived norms for alcohol use. Children's perceived norms regarding adolescent alcohol use were assessed by asking children "How wrong do you think it is for someone your age to drink beer, wine, wine coolers, or liquor?" with anchors 1 (*not at all wrong*) and 4 (*very wrong*). Children participating in Capable Families were also asked "How wrong do you think it is for someone your age to drink enough beer, wine, wine coolers, or liquor to get drunk?" with anchors 1 (*not at all wrong*) and 4 (*very wrong*). Responses to both items were reversed scored so that higher values reflect the belief that adolescent alcohol use is more normative. In Capable Families, the average reliability across waves of data was .76, and responses were averaged to yield a single score per child at each wave.

Children's perception of global parenting. Children's perception of parents' global parenting was assessed with 20 items that are available in Madon et al. (2003) and upon request. These items assessed family-centered factors, including parental affective quality (e.g., "During the past month when you and your mom have spent time talking or doing things together, how often did she get angry at you?"), parental practices regarding standard setting (e.g., "How often does your mom ask you what you think before making a decision that affects you?"), parental monitoring of child behavior (e.g., "How often does your mom know when you get into trouble at school or some place else away from home?"), and parental discipline (e.g., "When you do something wrong and your mom decides on the discipline, how often can you get out of it?"). The affective quality items were assessed with 7-point scales with anchors 1 (*always*) and 7 (*never*). The remaining items were assessed with 5-point scales with anchors 1 (*almost always*) and 5 (*almost never*). Items were reverse scored as necessary. In the case of dual-parent households, children responded to

each item twice—once for their mothers and once for their fathers—and their responses were averaged. To combine the items into a single scale, we rescaled the 5-point scale responses into a 7-point scale format (i.e., 1 → 1.0; 2 → 2.5; 3 → 4.0; 4 → 5.5; 5 → 7.0) and then averaged responses to produce one score per child at each wave. Higher values reflect more positive perceptions of global parenting. The average reliability of the items across waves of data was .94 in Capable Families and .93 in Rural Family.

Children's self-assessed likelihood of drinking alcohol in the future. To assess children's beliefs about their likelihood of drinking alcohol in the future, we asked children to respond to the following statement on a 5-point response scale with anchors 1 (*definitely yes*) and 5 (*definitely not*): "Sometimes we don't know what we'll do in the future, but we may have an idea. For the next question, please make your best guess. I will drink beer, wine, or liquor before I'm 21 years old." Responses to this item were reversed scored so that higher values reflect a greater self-assessed likelihood of drinking alcohol in the future. Children participating in Capable Families were also asked "Do you think you will use any of these within the next year: Beer, wine, wine coolers, or liquor (excluding use during religious ceremonies)?" with anchors 1 (*definitely not*) and 5 (*definitely yes*). Responses to these two items were averaged to create one score for each child per wave. The average reliability across waves of data for these items was .73.

Children's alcohol use. Children answered a series of questions about their alcohol use. Two items were assessed with an open-ended response format: (a) "During the past month, how many times have you had beer, wine, wine coolers, or other liquor?" and (b) "During the past month, how many times have you had three or more drinks (beer, wine, or other liquor) in a row?" In Rural Family, this latter item was added to the survey at Wave 2. Responses to the open-ended items were dichotomized by assigning a value of 0 to children who reported no episodes of drinking and assigning a value of 1 to children who reported one or more episodes of drinking. The remaining three items that assessed children's alcohol use differed across samples. In Capable Families, the items were as follows: (c) "How often do you currently drink alcoholic beverages?"; (d) "How often do you currently drink alcoholic beverages without a parents' permission?"; and (e) "How often do you usually get drunk?" Children responded to these items on a 7-point scale with anchors 1 (*not at all*) and 7 (*about every day*). Responses to each item were dichotomized by assigning a value of 0 to responses indicating no episodes of drinking (i.e., responses of 1) and assigning a value of 1 to responses indicating some amount of drinking (i.e., responses of 2 through 7). In Rural Family, the remaining three items were as follows: (c) "Have you ever drunk beer, wine, wine coolers, whiskey, gin, or other liquor?"; (d) "Have you ever drunk beer, wine, or liquor without a parent's permission?"; and (e) "Have you ever been drunk from drinking beer, wine, wine coolers, or liquor?" Children responded to these items by using a no–yes format (i.e., no = 0, yes = 1). An alcohol-use score was created for each child by summing the coded responses at each wave.[4] For children participating in Capable Families, scores could range from a minimum of 0 to a maximum of 5. For children participating in Rural Family, scores could range from a minimum of 0 to a maximum of 4 for alcohol use at Wave 1 and from a minimum of 0 to a maximum of 5 for alcohol use at Waves 2–5. It is worthwhile to note that even though in Rural Family children's alcohol use was assessed with a slightly different scale at Wave 1 than at all subsequent waves, only alcohol use at Waves 2–5 served as the dependent variable. Thus, the range of the dependent variable never varied across analyses. The Kuder–Richardson

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[4] We dichotomized responses to the alcohol-use items because doing so created a common metric and reduced the influence of extreme responses. Additional analyses that used *z*-score transformations of responses to these items yielded results that were in all ways consistent with the findings from the analyses of the dichotomized responses.

20 was used to assess the reliability of the alcohol-use items. Across waves of data, the average reliability of the items was .88 in Capable Families and .86 in Rural Family.

Results

Preliminary Analyses

Descriptive statistics. Table 1 presents the means, standard deviations, and zero-order correlations among the individual-level variables for both data sets at Wave 1.

Residualized variables. Using models that are conceptually similar to those shown in Figures 1 and 2, we conducted path analyses in LISREL 8.30 (Jöreskog & Sörbom, 1999) to examine the accumulation, dissipation, and stability of self-fulfilling prophecy effects over time. However, before these analyses could be performed, several issues needed to be addressed. First, the data were obtained from families participating in large intervention trials in which families had been randomly assigned either to a control condition or to one of two interventions designed to prevent adolescent substance use and other problem behaviors (see Footnote 2). Second, the data are hierarchically structured. Children in both data sets were clustered within schools, and in Capable Families, schools were matched to form blocks of three schools each. Third, because only inaccurate beliefs can be self-

fulfilling, the accuracy of mothers' beliefs had to be accounted for by controlling for the valid predictors of adolescent alcohol use (see Figure 3). However, because of the relations among these valid predictors, including them in the path models as simultaneous predictors of mothers' beliefs and children's alcohol use would have introduced multicollinearity (see Table 1), thereby inflating the standard errors of the parameter estimates and reducing their stability (Kessler & Greenberg, 1981).

We addressed these issues by removing the effect of the condition, cluster variables, and valid predictors from the relations between mothers' beliefs and children's alcohol use prior to performing the path analyses. Specifically, using SAS PROC MIXED (Littell, Milliken, Stroup, & Wolfinger, 1996), we performed two separate analyses in which we regressed mothers' belief raw scores and children's alcohol-use raw scores on the condition to which families had been assigned in the larger study, the cluster variables, and the valid predictors of adolescent alcohol use. These analyses were performed separately for each wave and sample, and the resulting residuals were then used in the path analyses. Each mother's belief residual yielded by these analyses represents the inaccurate portion of a mother's belief because it equals the degree to which her belief was greater or less than what would have been predicted on the basis of her child's standing on the valid predictors (see Figure 3). A mother's belief residual greater than zero

Table 1

Zero-Order Correlations, Means, and Standard Deviations at Wave 1 for Capable Families (N = 487) and Rural Family (N = 288)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Family income	—	.35**	.05	.01	−.13**	.06	−.12**	−.03	−.10*	−.12**	.14**	−.12**	−.03
2. Parental education	.26**	—	−.06	−.10*	−.16**	.02	−.09*	.06	−.13**	−.11*	.21**	−.17**	−.08
3. Parental drinking status	.03	.01	—	.24**	.07	−.03	−.02	.03	.02	.04	−.12**	.07	.04
4. Amount of parental drinking	−.02	.01	.37**	—	.17**	.00	.03	.08	.10*	.08	−.10*	.13**	.05
5. Mothers' belief raw scores[a]	.02	−.12*	.02	.08	—	−.17**	.16**	.08	.15**	.21**	−.31**	.27**	.19**
6. Gender[b]	.01	−.03	.01	.01	−.16**	—	.03	−.06	.00	.03	.04	.01	.01
7. Perception of friends' alcohol use	.03	.03	−.07	−.06	.11*	−.10	—	.29**	.23**	.40**	−.20**	.41**	.44**
8. Perceived accessibility of alcohol	.02	.14*	.02	.00	.12*	−.13*	.15**	—	.10*	.22**	−.08	.26**	.29**
9. Perceived rewards for alcohol use	−.07	−.14*	.00	.06	.11*	−.12*	.16**	.07	—	.27**	−.22**	.23**	.18**
10. Perceived norms for alcohol use	−.02	−.05	.06	.08	.22**	−.09	.25**	.17**	.24**	—	−.32**	.51**	.43**
11. Perception of global parenting	.15**	.25**	−.04	.04	−.25**	.11	−.19**	−.10	−.27**	−.15*	—	−.33**	−.26**
12. Self-assessed likelihood of drinking	.00	−.12*	.11	.06	.36**	−.16**	.31**	.29**	.22**	.49**	−.28**	—	.55**
13. Alcohol use	−.04	−.13*	.02	.02	.25**	−.01	.41**	.20**	.22**	.34**	−.19**	.40**	—
Capable Families													
M	44,098[c]	13.46	0.90	11.23	3.31	47%[d]	1.29	1.65	1.52	1.13	5.48	1.41	0.18
SD	23,974	1.71	0.30	15.95	1.59		0.60	0.98	0.54	0.34	0.76	0.69	0.74
Rural Family													
M	41,293[c]	13.82	0.71	7.46	2.40	55%[d]	1.25	1.96	1.58	1.12	5.57	1.23	0.31
SD	38,103	1.89	0.45	12.97	1.22		0.78	1.19	0.65	0.39	0.81	0.61	0.83

Note. Correlations above the diagonal are based on data from Capable Families. Correlations below the diagonal are based on data from Rural Family. Capable Families = Capable Families and Youth Study; Rural Family = Rural Family and Community Drug Prevention Project.
[a] Correlation results for mothers' belief raw scores are provided in lieu of those for mothers' belief residuals because the latter were generated by regressing mothers' belief raw scores on all other predictor variables, thereby yielding correlations equal to 0. [b] Boys were coded as 1, and girls were coded as 2. [c] The median income of families at Wave 1 was $40,000 in Capable Families and $36,000 in Rural Family. [d] Value reflects percentage of children who were girls.
* $p \leq .05$. ** $p \leq .01$.

reflects an unfavorable belief because it overestimates her child's alcohol use in comparison to what was predicted by the child's valid predictors. A mother's belief residual less than zero reflects a favorable belief because it underestimates her child's alcohol use in comparison to what was predicted by the child's valid predictors. A mother's belief residual approximating zero reflects a relatively accurate belief about her child's alcohol use because it corresponds closely to what was predicted by the child's valid predictors.

Short-term self-fulfilling prophecy effects. Testing whether mothers' self-fulfilling effects accumulate, dissipate, or remain stable over time is warranted only if self-fulfilling prophecies characterize relations between mothers' beliefs and children's alcohol use within a single time frame—that is, from one wave of assessment to the next. Therefore, we performed preliminary analyses that tested for these short-term self-fulfilling prophecy effects (e.g., from Wave 1 to Wave 2, from Wave 2 to Wave 3, etc.). These analyses include early waves of data examined in Madon et al. (2003, 2004), plus several later waves of data not included in those previously published studies. Figure 4 depicts the final models that were used. Initially, we omitted the paths corresponding to the self-fulfilling effect of mothers' belief residuals on children's alcohol-use residuals (i.e., Paths d, e, and f in the top half of Figure 4 and Paths p, q, r, and s in the bottom half of Figure 4). The effects corresponding to Paths a, k, and l were included because they markedly improved model fit ($ps \leq .01$), whereas effects among nonadjacent assessments of the outcome were not supported ($ps \geq .05$). We next tested for changes in model fit by adding the paths representing the self-fulfilling effect of mothers' belief residuals on children's alcohol-use residuals (i.e., Paths d, e, and f in the top half of Figure 4 and Paths p, q, r, and s in the bottom half of Figure 4). Results supported the occurrence of short-term self-fulfilling prophecy effects. In both samples, adding these paths to the models resulted in significant improvements in model fit: Capable Families, $\Delta\chi^2(3, N = 487) = 10.60$, $p < .05$; Rural Family, $\Delta\chi^2(4, N = 288) = 21.91$, $p \leq .01$.

The final models provided good fits for both data sets: Capable Families, $\chi^2(5, N = 487) = 4.94$, *ns*, standardized root-mean-square residual = .016, comparative fit index = 1.00; Rural Family, $\chi^2(13, N = 288) = 10.88$, *ns*, standardized root-mean-square residual = .032, comparative fit index = 1.00. Examination of the individual path results presented in Figure 4 reveals that with the exception of Path d, all other paths relating mothers' belief residuals to children's alcohol-use residuals attained signif-
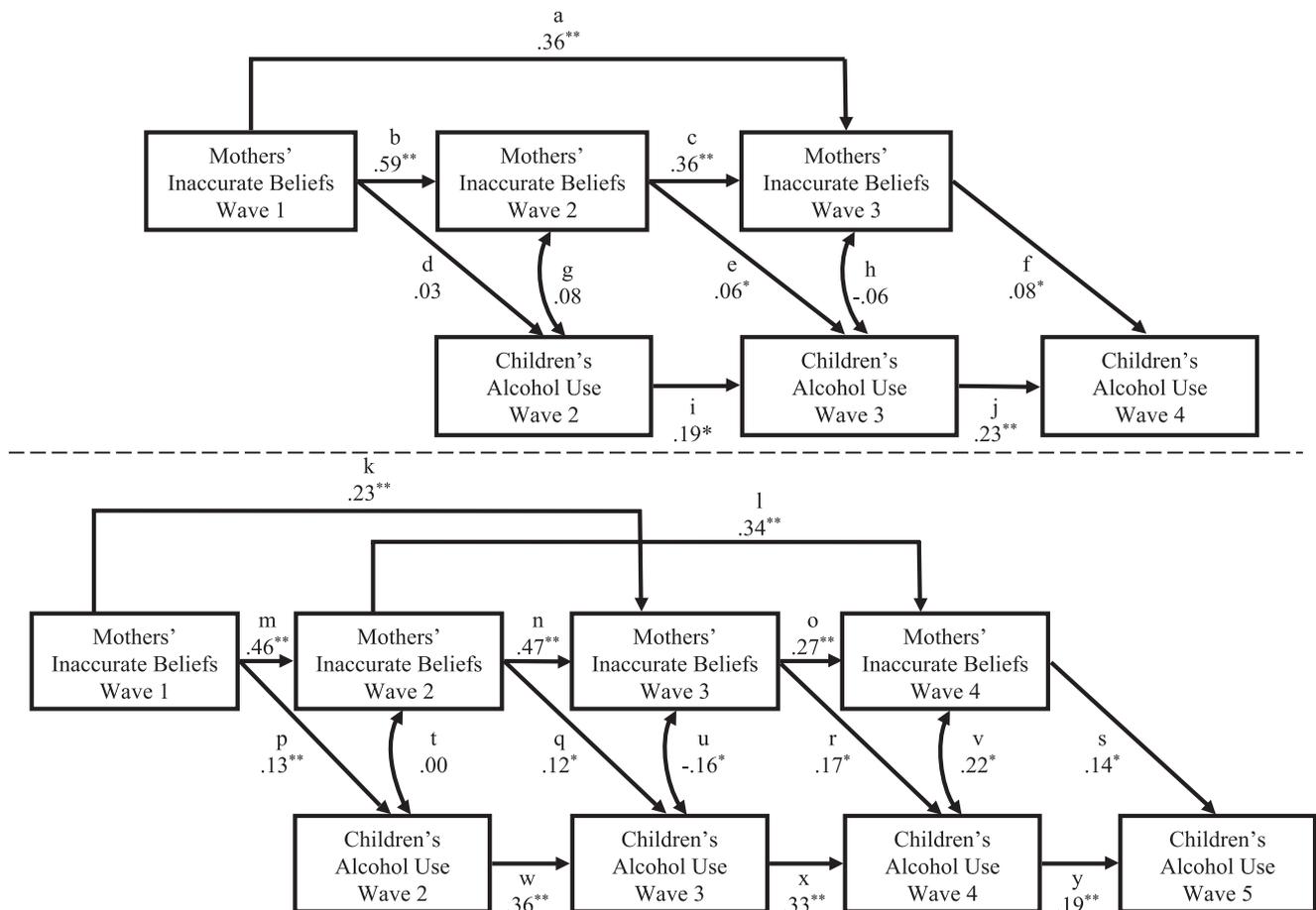

Figure 4. Short-term self-fulfilling prophecy effects in the Capable Families and Youth Study (top) and the Rural Family and Community Drug Prevention Project (bottom). *$p \leq .05$. **$p \leq .01$.

icance. Moreover, these relations were all algebraically positive, meaning that children whose mothers had overestimated their alcohol use showed greater increases in drinking at the next wave, and children whose mothers had underestimated their alcohol use showed smaller increases in their drinking at the next wave. Although these findings basically replicate previous investigations documenting the existence of self-fulfilling prophecy effects in naturalistic contexts (e.g., for reviews, see Jussim & Eccles, 1995; Jussim et al., 1996; Jussim & Harber, 2005), this is the first study to consider repeated assessments of both perceivers' beliefs and targets' outcomes within an enduring relationship. As such, the present findings are the first to demonstrate that a target's outcome can be continually and repeatedly influenced by the beliefs of the same perceiver via short-term self-fulfilling prophecy effects across a number of years. These findings also justify testing for long-term self-fulfilling prophecy effects in these data.

Main Analyses

To examine whether mothers' self-fulfilling prophecy effects accumulate, dissipate, or remain stable over time, we performed two sets of main analyses. One set of analyses draws on the single belief model (see Figure 1) to test whether the inaccurate beliefs held by mothers at one point in time have stronger (i.e., accumulating), weaker (i.e., dissipating), or stable self-fulfilling effects on their children's alcohol use assessed repeatedly across time. The other set of analyses draws on the repeated belief model (see Figure 2) to test whether mothers' inaccurate beliefs repeatedly assessed across time have stronger (i.e., accumulating), weaker (dissipating), or stable self-fulfilling effects on their children's alcohol use assessed at a single later point in time.

Single belief model. These analyses applied the conceptual model depicted in Figure 1 to test whether the self-fulfilling effects that mothers' inaccurate beliefs have on their children's alcohol use in early adolescence become stronger, weaker, or remain stable across later years of adolescence. Because these analyses test whether the self-fulfilling effect of a belief changes in magnitude across repeated assessments of an outcome, we performed one analysis for each belief that preceded two or more assessments of children's alcohol use. For example, we performed three analyses on the Rural Family data set—one testing the long-term self-fulfilling effects of mothers' belief residuals at Wave 1 on children's alcohol-use residuals at Waves 2, 3, 4, and 5; a second testing the long-term self-fulfilling effects of mothers' belief residuals at Wave 2 on children's alcohol-use residuals at Waves 3, 4, and 5; and a third testing the long-term self-fulfilling effects of mothers' belief residuals at Wave 3 on children's alcohol-use residuals at Waves 4 and 5. We performed a corresponding set of analyses on the Capable Families data set.

Results would support the accumulation of self-fulfilling prophecy effects over time if mothers' belief residuals more strongly predicted children's alcohol-use residuals at more distal waves than at more proximal waves. Results would support the dissipation of self-fulfilling prophecy effects over time if mothers' belief residuals less strongly predicted children's alcohol-use residuals at more distal waves than at more proximal waves. Results would support the stability of self-fulfilling prophecy effects over time if the degree to which mothers' belief residuals predicted children's alcohol-use residuals at more distal waves did not differ from the

degree to which they predicted children's alcohol-use residuals at more proximal waves. We examined these relations by using LISREL 8.30 (Jöreskog & Sörbom, 1999). These analytic models tested for significant reductions in chi-square (which would signify significant improvements in model fit) that resulted from removing the constraint that the total effect of mothers' belief residuals on children's alcohol-use residuals be equal across all subsequent waves at which the outcome was assessed. Significant improvements in model fit would support either the accumulation or dissipation of self-fulfilling prophecy effects over time, depending on whether the effect increased or decreased over time. Across these analyses, results indicated that the effect of mothers' belief residuals on children's alcohol-use residuals at the more distal waves did not significantly differ from the effect of mothers' belief residuals on children's alcohol-use residuals at the more proximal waves (see Table 2). These findings indicate that, on average, the self-fulfilling effects that mothers had on their children's alcohol use during early adolescence remained relatively stable over time.

Repeated belief model. These analyses applied the conceptual model depicted in Figure 2 to test whether the inaccurate beliefs held by mothers at different points in time each had their own self-fulfilling prophecy effect on children's alcohol use assessed at a single later point in time. Results for the individual paths (including the short-term self-fulfilling effects of mothers' inaccurate beliefs on children's alcohol use at each wave) are identical to those presented in Figure 4. Table 3 presents the results that bear on the hypothesis that a perceiver's inaccurate beliefs assessed at different points in time can exert their own independent self-fulfilling prophecy effect on a subsequent target outcome assessed at a single point in time. For each assessment of the outcome, these results are the total effects of all preceding mothers' belief residuals. Results indicated that for every case in which an outcome was preceded by two or more belief residuals, children's alcohol-use

Table 2

Long-Term Self-Fulfilling Prophecy Effects: Single Belief Model

Mother belief assessment	Outcome assessment	$\Delta\chi^2$
Capable Families (*N* = 487)		
Wave 1	Waves 2, 3, & 4	$\Delta\chi^2(2) = 0.62$
Wave 2	Waves 3 & 4	$\Delta\chi^2(1) = 1.81$
Rural Family (*N* = 288)		
Wave 1	Waves 2, 3, 4, & 5	$\Delta\chi^2(3) = 2.49$
Wave 2	Waves 3, 4, & 5	$\Delta\chi^2(2) = 0.24$
Wave 3	Waves 4 & 5	$\Delta\chi^2(1) = 1.21$

Note. Mother belief assessment refers to the wave at which mothers' beliefs were assessed. Outcome assessment refers to the waves at which children's alcohol use was assessed. The $\Delta\chi^2$ statistic tests whether the effects of a single belief differ with time across the repeated assessments of the outcome. All changes in chi-square were nonsignificant. Moreover, additional analyses that tested for changes in self-fulfilling prophecy effects across each of the 14 possible pairs of outcome assessments also failed to attain significance (e.g., for Wave 1 beliefs in the Capable Families data, testing for differences in their effects on the outcome between Waves 2 and 3, between Waves 2 and 4, and between Waves 3 and 4). Capable Families = Capable Families and Youth Study; Rural Family = Rural Family and Community Drug Prevention Project.

Table 3

Long-Term Self-Fulfilling Prophecy Effects: Repeated Belief Model

Outcome assessment	Mother belief assessment			
	Wave 1	Wave 2	Wave 3	Wave 4
Capable Families (N = 487)				
Wave 3	.04*	.06*		
Wave 4	.06*	.04*	.08*	
Rural Family (N = 288)				
Wave 3	.10**	.12*		
Wave 4	.11**	.12**	.17*	
Wave 5	.06**	.09**	.07**	.14*

Note. Outcome assessment refers to the wave at which children's alcohol use was assessed. Mother belief assessment refers to the wave at which mothers' beliefs were assessed. Values correspond to the total effects (i.e., both direct and indirect effects) of mothers' belief residuals on children's alcohol-use residuals. Capable Families = Capable Families and Youth Study; Rural Family = Rural Family and Community Drug Prevention Project.
* $p \leq .05$.   ** $p \leq .01$.

residuals were significantly predicted by each and every mothers' belief residual that preceded it. This finding indicates that the inaccurate beliefs held by mothers at different points in time each had their own independent self-fulfilling effect on children's subsequent alcohol use.

These results reveal the potential for self-fulfilling prophecy effects to accumulate, dissipate, or remain stable over time depending on the particular combination of inaccurate beliefs that a mother held about her child at different points during adolescence. The potential for self-fulfilling prophecy effects to accumulate over time exists for children whose mothers either consistently over- or underestimated their alcohol use. The potential for self-fulfilling prophecy effects to dissipate over time exists for children whose mothers sometimes overestimated but other times underestimated their alcohol use. The potential for self-fulfilling prophecy effects to remain relatively stable over time exists for children whose mothers' earlier belief (e.g., at Wave 1) either over- or underestimated their alcohol use (e.g., at Wave 3), but whose later belief(s) (e.g., at Wave 2) did not.

Figure 5 shows the process of accumulation over time for mothers' beliefs that overestimated children's alcohol use at each wave among participants in the Capable Families and Rural Family studies. The pattern of findings are similar across the two samples. In both samples, the data indicate that mother belief overestimates added up over time. For example, in Rural Family, mothers' belief residuals at Waves 1, 2, 3, and 4 each independently contributed to children's alcohol-use residuals at Wave 5. That is, the predicted alcohol use of children whose mothers had overestimated their alcohol use at each wave was greater at each subsequent wave than it would have been had only a single assessment of mother belief overestimates been considered. For example, children's alcohol use was predicted to be 0.84 at Wave 2, 1.45 at Wave 3, 2.49 at Wave 4, and 3.47 at Wave 5 for mothers' beliefs that overestimated their children's alcohol use by one standard deviation at each wave. Subtracting the average amount

of alcohol use in the sample at each wave (i.e., 0.70 at Wave 2, 1.20 at Wave 3, 2.02 at Wave 4, and 3.03 at Wave 5) from these predicted values yields the additional amounts of alcohol use predicted by a consistent history of mother belief overestimates (i.e., 0.14 at Wave 2, 0.25 at Wave 3, 0.47 at Wave 4, and 0.44 at Wave 5). By contrast, had only the first assessment of mothers' beliefs been considered, these children's predicted alcohol use would have instead been only 0.84 at Wave 2, 1.22 at Wave 3, 2.09 at Wave 4, and 3.16 at Wave 5, with the additional amounts of alcohol use predicted by mother belief overestimates assessed at Wave 1 equal to 0.14 at Wave 2, 0.02 at Wave 3, 0.07 at Wave 4, and 0.13 at Wave 5. A corresponding (albeit beneficial) pattern of accumulation occurred for children whose mothers had consistently underestimated their alcohol use.

The additive self-fulfilling effects of mothers' belief residuals on children's alcohol-use residuals that occurred over time served to first exacerbate and then maintain an initial difference in the alcohol use of children whose mothers had over- versus underestimated their alcohol use year after year. Figure 6 illustrates this pattern for mothers and children participating in Rural Family. The bars represent the predicted alcohol use of children whose mothers had overestimated and underestimated their alcohol use by one standard deviation at each wave. The pattern indicates that at each wave children exposed to mother belief overestimates tended to drink more alcohol than children exposed to mother belief underestimates. In addition, the difference in these children's alcohol use became increasingly larger across Waves 2, 3, and 4 and then appear to have stabilized. For example, at Wave 2, there was a 0.28 predicted difference in the alcohol use of children whose alcohol use had been over- versus underestimated by their mothers. This predicted difference was almost twice as large by Wave 3 (i.e., 0.49) and was more than three times as large by Wave 4 (i.e., 0.94), after which it stabilized (i.e., 0.88). Accordingly, these data indicate mothers' self-fulfilling effects accumulated over time among children whose alcohol use was consistently over- versus underestimated by their mothers and that this process served to exacerbate initial differences between these children's alcohol use over time.

Discussion

This research tested whether self-fulfilling prophecy effects accumulate, dissipate, or remain stable over time with longitudinal data from two samples of mothers and children, in which children's alcohol use was the outcome variable. Analyses yielded three chief findings. First, analyses that examined the processes depicted by the single belief model indicated that the degree to which mothers' inaccurate beliefs assessed at one point in time predicted children's distal alcohol use did not differ from the degree to which they predicted children's proximal alcohol use. This finding indicates that, on average, mothers' self-fulfilling effects remained relatively stable over time for the samples on average. Second, analyses that examined the processes depicted by the repeated belief model indicated that mothers' self-fulfilling effects simultaneously accumulated, dissipated, and remained stable over time for individual children in the samples, depending on the particular combination of inaccurate beliefs to which a child had been exposed over time. Third, the accumulation of mothers' self-fulfilling effects over time exacerbated initial differences in
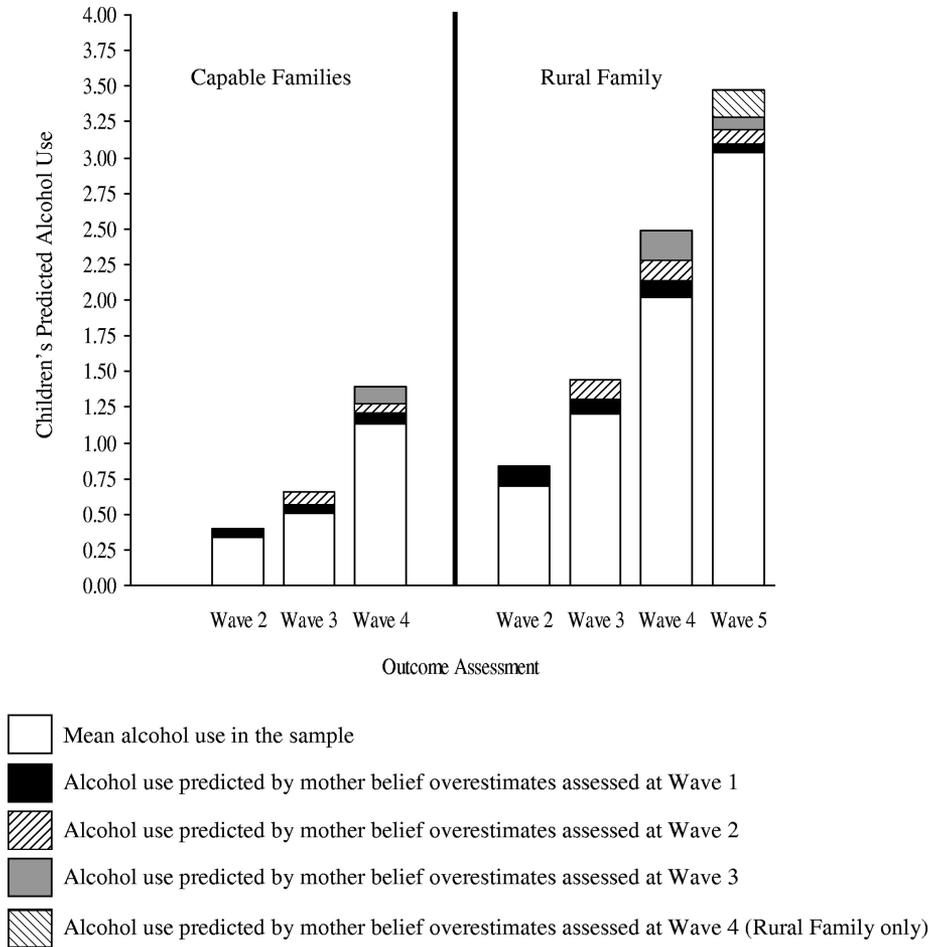
Figure 5. This graph shows children's predicted alcohol use across waves of data collection for those children whose mothers overestimated their alcohol use by one standard deviation at each wave. Children's alcohol use is shown in raw score units and could range from 0 to 5. Capable Families = Capable Families and Youth Study; Rural Family = Rural Family and Community Drug Prevention Project.

the alcohol use of children who were exposed to consistent histories of unfavorable versus favorable beliefs. Before discussing the importance of these findings, we address general issues involved in the interpretation of naturalistic data.

Interpreting Results From Naturalistic Studies

Correlational designs do not provide as strong a basis for causal inference as do experimental designs. With a correlational design, one cannot determine whether the predictor variable caused changes in the dependent variable, the dependent variable caused changes in the predictor variable, or a third variable caused changes in both the predictor and the dependent variables. However, longitudinal correlational designs—such as the one used herein—do rule out the possibility that the dependent variable exerted a causal influence on the predictor variable because measurement of the predictor variable is temporally antecedent to changes in the dependent variable. For example, in our data we can be certain that children's alcohol use at Wave 4 did not influence mothers' beliefs at Wave 1.

Longitudinal designs do not, however, rule out the possibility that both the predictor and the dependent variables could have been caused by a third, unmeasured variable. The potential omission of a valid predictor is a limitation that characterizes all naturalistic research. No matter how many controls are included in an analytic model, it is always possible that a relevant variable was omitted. In the current study, the potential omission of a valid predictor raises the possibility that mothers based their beliefs on a valid predictor of adolescent alcohol use that was not included in the model. If this were to occur, then mothers would be more accurate than estimated and their self-fulfilling effects would be smaller than reported. The omitted variable explanation corresponds to the suggestion that the effects attributed to self-fulfilling prophecies might instead have resulted from predictive accuracy. Although it is not possible to categorically rule out predictive accuracy as an alternative explanation of our findings, there are several reasons why we believe that the self-fulfilling prophecy interpretation is more compelling.
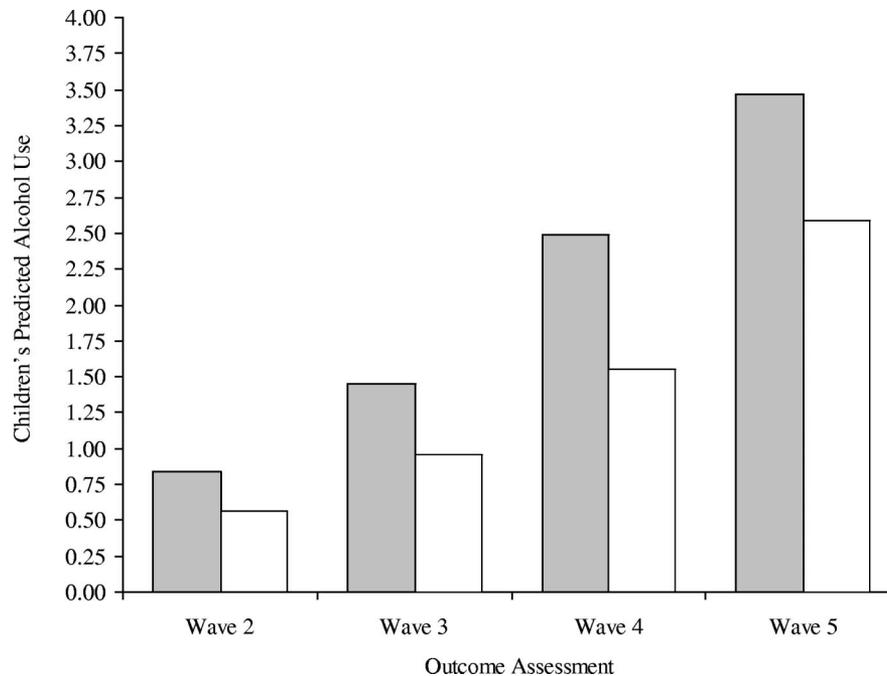
Figure 6. This graph shows children's predicted alcohol use at Waves 2, 3, 4, and 5 of the Rural Family and Community Drug Prevention Project for children whose mothers consistently overestimated (gray bars) and underestimated (white bars) their alcohol use by one standard deviation at each wave. Children's alcohol use is shown in raw score units and could range from 0 to 5.

First, a self-fulfilling prophecy interpretation is consistent with a long history of experimental findings demonstrating that perceivers' inaccurate beliefs influence targets' behaviors by means of self-fulfilling prophecies (e.g., Biesanz, Neuberg, Smith, Asher, & Judice, 2001; Rosenthal & Jacobson, 1968; Snyder & Swann, 1978; Snyder, Tanke, & Berscheid, 1977; Swann & Ely, 1984; for reviews, see Snyder, 1984, 1992; Snyder & Stukas, 1999). Although this convergence does not prove that our results reflect self-fulfilling prophecies, confidence in the validity of a general conclusion increases when naturalistic and experimental studies yield parallel findings.

Second, we controlled for a large number of theoretically and empirically supported predictors that comprised a range of constructs relevant to adolescent alcohol use. The inclusion of these valid predictors reduced the likelihood that an unmeasured third variable produced the relations between mothers' belief residuals and children's alcohol-use residuals. In fact, the valid predictors that we included in the analyses explained between 38% and 56% ($M = 49\%$) of the variance in children's alcohol use at the next wave, which exceeds the percentage of variance that is typically accounted for when predicting similar outcomes (Reid, 1991; Spoth, 1997).

Third, if mothers' belief residuals had acted as a proxy for some unmeasured valid predictor, then the pattern of variance that mothers' beliefs explained in children's alcohol use should be similar to the pattern explained by the valid predictors that were assessed. To examine whether this was the case in our data, we examined whether the pattern of variance that mothers' belief residuals at a particular wave (e.g., Wave 1) explained in children's alcohol-use residuals at all subsequent waves (e.g., Waves 2, 3, and 4) was similar to the pattern of variance that the set of measured valid predictors at a particular wave (e.g., Wave 1) explained in children's alcohol-use raw scores at all subsequent waves (e.g., Waves 2, 3, and 4). However, in contrast to a predictive accuracy explanation of the findings, the patterns of explained variance were not similar. Whereas mothers' belief residuals tended to explain greater amounts of variance in children's alcohol-use residuals over time, the measured valid predictors tended to explain smaller amounts of variance in children's alcohol-use raw scores over time. For example, in Capable Families, the amount of variance that mothers' belief residuals at Wave 1 explained in children's alcohol-use residuals at Waves 2, 3, and 4 steadily increased (i.e., Wave 2, $R^2 = 0.1\%$; Wave 3, $R^2 = 0.6\%$; Wave 4, $R^2 = 1.5\%$), whereas the amount of variance that the measured valid predictors at Wave 1 explained in children's alcohol-use raw scores at Waves 2, 3, and 4 steadily decreased (i.e., Wave 2, $R^2 = 49\%$; Wave 3, $R^2 = 39\%$; Wave 4, $R^2 = 27\%$). A similar pattern of divergence characterized the other waves of data in both data sets.

In sum, the convergence of our findings with those from the experimental literature, coupled with the strong set of valid predictors of adolescent alcohol use used in the analytic models and the tendency for mothers' belief residuals to behave differently than these valid predictors, lead us to conclude that the occurrence of self-fulfilling prophecies is the more tenable explanation for the current findings.

Accumulation of Self-Fulfilling Prophecy Effects: Theoretical and Practical Implications

Psychological theory proposes that self-fulfilling prophecies can contribute to social inequalities by virtue of their ability to accu-

mulate over time (for reviews, see Jussim et al., 1996; Klein & Snyder, 2003; Snyder & Stukas, 1999). However, empirical research has tended to disconfirm this hypothesis. The extant literature has found that perceivers' self-fulfilling effects tend to dissipate over time rather than accumulate. This pattern has most consistently emerged within terminal relationships that are characterized by decreases in perceiver–target interaction over time (e.g., Rosenthal & Jacobson, 1968; Smith et al., 1999; West & Anderson, 1976). However, even within enduring relationships where perceiver–target interaction remains high, support for the hypothesis that self-fulfilling prophecy effects accumulate over time is mixed. Whereas one study supported a pattern of accumulation over time (Rosenthal & Jacobson, 1968), another supported a pattern of dissipation over time (Smith et al., 1999).

Therefore, we examined the processes of accumulation, dissipation, and stability over time in two samples of mother–child dyads. Replicating previous work, we first examined these processes in terms of the single belief model. Consistent with a pattern of stability over time, the degree to which mothers' inaccurate beliefs predicted children's proximal alcohol use did not differ from the degree to which they predicted children's distal alcohol use. Although this finding does not support the longstanding hypothesis that inaccurate beliefs assessed at one point in time have successively stronger self-fulfilling effects on targets' outcomes repeatedly assessed across time, it does suggest that, on average, inaccurate beliefs do have long-lasting self-fulfilling prophecy effects on targets' outcomes within enduring relationships.

We also examined the processes of the repeated belief model, which had not previously been considered. Our findings indicated that mothers' inaccurate beliefs assessed at different points in time each exerted independent self-fulfilling effects on their children's subsequent alcohol use beyond the inaccurate beliefs that they held earlier in time. This finding provides evidence that the amount of alcohol children drank depended on the particular combination of inaccurate beliefs that their mothers held about them in the past. This finding is important for several reasons. First, it provides evidence that perceivers' self-fulfilling effects accumulated over time for those targets who were exposed to unfavorable or favorable beliefs year after year. This is the first time that the accumulation of self-fulfilling prophecy effects over time has ever been demonstrated with respect to the particular pattern of inaccurate beliefs that an individual perceiver holds about a target. Second, it shows that the later beliefs that a perceiver develops about a target over the course of their ongoing relationship matter above and beyond the beliefs that the perceiver developed earlier. In our data, for example, by not taking into consideration the self-fulfilling effects of mothers' later beliefs, the total combined self-fulfilling effect that some mothers had on their children's subsequent alcohol use was underestimated. Moreover, the magnitude by which these mothers' total self-fulfilling effects were underestimated grew over time. Third, our findings therefore suggest that the short-term self-fulfilling prophecy effects reported in the literature may underestimate the true extent to which self-fulfilling prophecies influence some targets' outcomes because they have not accounted for the possibility that a perceiver's later inaccurate beliefs may also have self-fulfilling effects on top of the self-fulfilling effects caused by the perceiver's earlier inaccurate beliefs.

Self-Fulfilling Prophecies and Inequalities

The potential for self-fulfilling prophecies to accumulate over time has been of particular interest to social scientists because of the possibility that the gap between individuals who are the targets of unfavorable versus favorable inaccurate beliefs could widen as time passes (Jussim et al., 1996; Klein & Snyder, 2003; Snyder & Stukas, 1999). The findings of the current study were consistent with this long-standing concern. Over time, the accumulation of mothers' self-fulfilling effects exacerbated initial differences in the alcohol use of children who were consistently exposed to mother belief over- versus underestimates. Thus, what began as small differences in the drinking behavior of young adolescents who were the targets of unfavorable (i.e., overestimates) versus favorable (i.e., underestimates) beliefs gradually widened over time into larger differences.

The tendency for mothers' inaccurate beliefs to have this accumulating effect over time has important implications for youth. First, it provides evidence that despite the increasing influence of peers during adolescent development, parents continue to have important socializing influences on their children's alcohol use throughout adolescence (Catalano & Hawkins, 1996). Second, it suggests that some children are initiating alcohol use at an earlier age, drinking more alcohol than others, and showing a sharper rise in their alcohol use over time as a result of the unfavorable beliefs that their mothers hold about them over time. This pattern is of particular importance given that children who initiate substance use at a young age are at increased risk for violent behavior, serious bodily injury, early sexual activity, and substance abuse and dependence (Hawkins et al., 1992), outcomes that can produce considerable costs to society (Harwood, Fountain, & Livermore, 1998; Spoth, Guyll, & Day, 2002).

Mediators of Parents' Self-Fulfilling Effects

Self-fulfilling prophecies can arise only if perceivers treat targets in a way that is consistent with their inaccurate beliefs (Darley & Fazio, 1980). Research addressing the mediation of self-fulfilling prophecy effects indicates that differential expectations on the part of perceivers result in different behavioral orientations toward targets. For example, in comparison with teachers who hold unfavorable beliefs about students' achievement, teachers who hold favorable beliefs deliver more instruction, provide feedback that is clearer and more contingent on students' performance, and offer more opportunities for students to practice their skills and convey their knowledge (Harris & Rosenthal, 1985; Rosenthal, 1973). Although to our knowledge no research has examined the mediating mechanisms by which parents create self-fulfilling prophecies with respect to their children's outcomes, Harris (1993) has identified specific behaviors that parents may use to manage their children's behavior, including several that are relevant to adolescent alcohol use. For example, parents who underestimate their children's likelihood of alcohol use may encourage and facilitate their children's participation in a variety of normative activities, such as sports, band, theater, and summer camp. Because normative activities are typically structured and monitored by responsible adults, participating children may have fewer opportunities to engage in antisocial behaviors and to develop friendships that encourage alcohol use (Catalano &

Hawkins, 1996). Thus, parents' inaccurate beliefs may influence the way that they structure their children's free time, which, in turn, could shape their children's future alcohol use in an expectancy-consistent way.

Conclusion

Self-fulfilling prophecies have long been thought to contribute to social problems by generating and perpetuating inequalities between individuals and groups who are the targets of unfavorable versus favorable beliefs (for a review, see Klein & Snyder, 2003). The accumulation of self-fulfilling prophecy effects over time is one means through which such inequalities have been hypothesized to arise (e.g., Jussim et al., 1996; Klein & Snyder, 2003; Snyder & Stukas, 1999). However, past research has not provided clear evidence in support of the accumulation-over-time hypothesis (Rosenthal & Jacobson, 1968; Smith et al., 1999; West & Anderson, 1976). Therefore, we examined long-term self-fulfilling prophecy effects from the perspectives of two distinct conceptual models. We first examined long-term self-fulfilling prophecy effects from the perspective of the single belief model, which has been the focus of past research. These analyses indicated that, on average, mothers' self-fulfilling prophecy effects remained relatively stable over time and did not tend to accumulate.

We next examined long-term self-fulfilling prophecy effects from the perspective of the repeated belief model, which had not previously been examined. These analyses indicated that mothers' self-fulfilling prophecy effects were simultaneously accumulating, dissipating, and remaining stable over time, with the particular long-term pattern depending on the combination of inaccurate beliefs to which a child had been exposed over time. The process of accumulation over time occurred among children whose mothers consistently held either unfavorable or favorable beliefs about their alcohol use year after year. In addition, the tendency for mothers' self-fulfilling effects to accumulate over time among these children served to exacerbate initial differences in their alcohol use. The tendency for mothers' self-fulfilling prophecy effects to widen the gap in these children's alcohol use over time supports the historical view that self-fulfilling prophecies can contribute to social problems by virtue of accumulating over time.

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