The Mediation of Mothers' Self-Fulfilling Effects on Their Children's Alcohol Use: Self-Verification, Informational Conformity, and Modeling Processes

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This research examined whether self-fulfilling prophecy effects are mediated by self-verification, informational conformity, and modeling processes. The authors examined these mediational processes across multiple time frames with longitudinal data obtained from two samples of mother–child dyads ($N_1 = 486$; $N_2 = 287$), with children's alcohol use as the outcome variable. The results provided consistent support for the mediational process of self-verification. In both samples and across several years of adolescence, there was a significant indirect effect of mothers' beliefs on children's alcohol use through children's self-assessed likelihood of drinking alcohol in the future. Comparatively less support was found for informational conformity and modeling processes as mediators of mothers' self-fulfilling effects. The potential for self-fulfilling prophecies to produce long-lasting changes in targets' behavior via self-verification processes are discussed.

Keywords: self-fulfilling prophecies, self-verification, informational conformity, modeling, adolescent alcohol use

Social psychological theory proposes that people can construct social reality through the process of a self-fulfilling prophecy. A self-fulfilling prophecy occurs when one person (a perceiver) causes her or his false belief about another person (a target) to become true (Merton, 1948). There is broad consensus within the social psychological literature that this process necessarily involves three core, sequential events (Darley & Fazio, 1980; Harris & Rosenthal, 1985; E. E. Jones, 1986; Jussim, 1986; Snyder, 1984). First, a perceiver must hold a false belief about a target. For example, a teacher may overestimate a student's ability, believing that the student is more capable than the student really is. Second, the perceiver's false belief must be communicated to the target by way of the perceiver's behavior toward the target. A teacher who overestimates a student's ability might communicate that belief to the student by calling on that student often, spending extra time with that student, teaching that student especially difficult material, and providing that student with feedback contingent on performance (Rosenthal, 1973). Third, the target must, in response to the perceiver's behavior, confirm the originally false belief. The student who is treated as if she or he is highly capable must

ultimately learn more than other students in the class, thereby confirming the teacher's originally false belief that she or he is highly capable. Thus, a self-fulfilling prophecy occurs when a perceiver's false belief influences how she or he treats a target, which, in turn, shapes the target's subsequent behavior in the direction of the initially false belief.

A large body of research addressing self-fulfilling prophecies has focused on the second step of this process—identifying the behaviors through which perceivers transmit or communicate their beliefs to targets. This literature has been the focus of several comprehensive reviews (Brophy, 1983; Harris & Rosenthal, 1985; Rosenthal, 1973). Brophy (1983) listed 17 behaviors that have been identified in previous studies as mediators of teachers' self-fulfilling effects on students' achievement outcomes, including waiting less time for low- versus high-expectancy students to answer a question, providing low-expectancy students with positive reinforcement for incorrect answers and poor behavior, and giving low-expectancy students less praise than high-expectancy students. Harris and Rosenthal (1985) performed a meta-analysis on 136 studies relevant to the mediation of self-fulfilling prophecies. They found that 15 specific behaviors exhibited by perceivers during their interaction with targets were significantly related to targets' subsequent outcomes, including a positive climate, praise, eye contact, smiles, speech rate, and frequency of interactions, among others. They also found that these 15 behaviors reflected four broad dimensions of behavior initially postulated by Rosenthal (1973)—the degree to which perceivers (a) create a warm and friendly social environment for targets, (b) provide targets with opportunities to develop their skills, (c) provide targets with opportunities to practice their skills, and, to a lesser extent, (d) provide targets with performance-based feedback. Thus, the literature addressing mediators of self-fulfilling prophecies has made significant contributions to the field by virtue of delineating spe-

cific behaviors and broad dimensions of behavior that operate as mediators of perceivers' self-fulfilling effects.

However, this literature has also been criticized on two grounds. First, many of the identified mediators are context specific, meaning that they principally apply to a single context. Second, most of the relevant studies have been based on teacher–student interactions (Harris, 1993; Harris & Rosenthal, 1985). Indeed, over 75% of the studies addressing the mediation of self-fulfilling prophecies have focused exclusively on behaviors that mediate teachers' self-fulfilling effects on students' achievement outcomes (Harris & Rosenthal, 1985). Therefore, most of what is known about the mediation of self-fulfilling prophecy effects is limited to behaviors that teachers exhibit to their students in the classroom. This fact has led some prominent self-fulfilling prophecy researchers to call for a more theoretically driven approach to the study of mediation—an approach aimed at explaining how self-fulfilling prophecies operate across a broad spectrum of life situations (Harris, 1993; Harris & Rosenthal, 1985).

As an initial step toward answering this call, the present investigation examined social psychological processes that have the potential to mediate self-fulfilling prophecies. The processes that we focused on were self-verification (Swann, 1987), informational conformity (Sherif, 1936), and modeling (Bandura, 1977). These processes have greater potential than do context-specific behaviors to mediate self-fulfilling prophecies across a variety of contexts and social relationships. Moreover, we tested these processes with longitudinal data obtained from two samples of mothers and their adolescent children, using children's alcohol use as the outcome variable. Accordingly, the present research also contributes to the extant literature by focusing on the family, a context that has been underrepresented in research addressing the mediation of self-fulfilling prophecies even though the family is of central importance to youth and their successful development (see Harris, 1993; Willard, Madon, Guyll, Spoth, & Jussim, in press, for exceptions). We next briefly discuss self-verification, informational conformity, and modeling processes and apply them to the mediation of self-fulfilling prophecies to generate our hypotheses.

Hypotheses

Self-Verification Hypothesis

Self-verification theory (Swann, 1987) posits that people have a basic desire to confirm their self-concepts. According to the theory, confirming one's self-concept—even when it is negative—is both existentially pleasing because it provides a stable sense of self and pragmatically advantageous because it creates a more predictable social environment (McNulty & Swann, 1994; Swann, 1987; Swann, Milton, & Polzer, 2000; Swann, Rentfrow, & Guinn, 2002). Ample research supports self-verification theory. People have better recall for information that is consistent with their self-concepts, retain such information more accurately, view it as more credible, and believe that it reflects their own abilities better than information that is inconsistent with their self-concepts (see S. C. Jones, 1973; Shrauger, 1975; Swann, 1987, for reviews). People also select interaction partners who provide feedback that is congruent with their self-concepts more often than interaction partners who provide feedback that is incongruent with their self-concepts (Swann, Pelham, & Krull, 1989; Swann & Predmore, 1985; Swann, Stein-Seroussi, & Giesler, 1992).

These sorts of self-verifying behaviors sometimes compete with behaviors that would otherwise bring about self-fulfilling prophecies. For example, if targets are motivated to behave in ways that are contrary to perceivers' false beliefs and more in line with their own self-concepts, then perceivers may be less able to elicit confirmatory behavior from targets (Swann & Ely, 1984; Swann et al., 2000). However, it is also conceivable that the two processes could operate in concert. Several prominent theorists have hypothesized that self-verification processes may facilitate the occurrence of self-fulfilling prophecies by mediating the influence that perceivers' false beliefs have on targets' subsequent behaviors (Brophy, 1983; Darley & Fazio, 1980; McNulty & Swann, 1994; Snyder, 1984; Snyder & Swann, 1978). That is, the false beliefs that perceivers hold about targets may shape and mold how targets view themselves. Because such changes in targets' self-views are not behavioral, they would not reflect a self-fulfilling prophecy per se. However, if targets internalize these self-views into their self-concepts, then they may engage in self-verification processes that could cause them to behaviorally confirm perceivers' initially false beliefs over extended periods of time.

Despite the potential theoretical importance of this hypothesis, it has been tested only once. Snyder and Swann (1978) demonstrated that targets' tendency to confirm perceivers' false beliefs carried over into a subsequent interaction with a new perceiver when targets were experimentally induced with the attribution that their prior confirmatory behavior reflected their own dispositional qualities. This finding is important because it shows that if targets internalize another's false belief about them, then they will tend to behaviorally confirm that internalized belief subsequently. In the present study, we built on this finding by examining whether a similar process operates in the naturalistic environment by virtue of targets naturally internalizing perceivers' false beliefs about them. The present research also examined whether such a process produces long-lasting changes in targets' behavior, as has been hypothesized in the theoretical literature (e.g., Snyder, 1984). We addressed these issues by testing whether mothers' false beliefs about their children's alcohol use altered how much alcohol children believed they were likely to drink in the future and whether these altered views of the self influenced children's subsequent alcohol use.

Informational Conformity Hypothesis

Conformity occurs when people change their behavior in response to real or perceived social influence (Aronson, Wilson, & Akert, 2007). Conformity theory is a cornerstone of social psychology. It has roots in the pioneering works of Asch (1952/1972) and Sherif (1936) and has helped to explain a whole range of behaviors from the benign to the horrific. Although research pertaining to conformity has remained largely independent from research pertaining to self-fulfilling prophecies, the fact that both involve behavioral changes that stem from interpersonal processes raises the possibility that the two processes may intersect. One point of intersection that is relevant to our work here is the possibility that conformity processes might mediate self-fulfilling prophecy effects. We addressed this possibility in the current research with respect to *informational conformity*. Informational conformity occurs when people conform to behaviors that they

believe are correct, appropriate, or socially desirable for a group (Aronson et al., 2007).[1]

Informational conformity could mediate self-fulfilling prophecy effects if the false beliefs that perceivers hold about targets influence targets' perceptions of acceptable or appropriate behavior, which targets then conform to in an effort to behave in a socially acceptable manner. For example, perceivers who overestimate targets' likelihood of engaging in a particular behavior might cause targets to believe that the behavior is more socially acceptable than targets had previously thought. These altered perceptions might then increase targets' likelihood of engaging in the behavior themselves. In the current study, we tested whether informational conformity mediates self-fulfilling prophecy effects by examining whether mothers' false beliefs about their children's alcohol use influenced how acceptable their children believe alcohol use is among adolescents and tested whether these perceptions, in turn, influenced children's subsequent alcohol use.

Modeling Hypothesis

Social learning theory (Bandura, 1977) posits that learning occurs within social contexts. Of central importance to the theory is the idea that learning often occurs vicariously; that is, people learn by observing the behaviors of others, a process referred to as *modeling*. Through modeling, people learn the underlying rules of a behavior, which then enables them to perform novel forms of the behavior. People are most likely to engage in modeling when they have rehearsed and encoded the model's behavior, believe that the model's behavior has positive or valued outcomes, and perceive the model to have an elevated status or to be similar to themselves (Bandura, 1977, 1983). Empirical research strongly supports modeling as a mechanism through which behavioral change can occur (e.g., Bandura, 1977, 1986, 1997; Collins & Bradizza, 2001; Kunkel, Hummert, & Dennis, 2006; Maisto, Carey, & Bradizza, 1999).

The fact that modeling elicits behavioral changes suggests that there could be a connection between it and self-fulfilling prophecies. In particular, it is conceivable that modeling may mediate self-fulfilling prophecy effects. This could happen if the behaviors that are modeled to targets are influenced by perceivers' false beliefs. For example, a mother who erroneously expects her child to refrain from alcohol use prior to age 21 might reduce how much alcohol she herself drinks in the home during her child's adolescence so as to set a good example. Such a mother might also influence her child's association with other children, encouraging relationships with children who are less likely to drink alcohol during adolescence, and discouraging relationships with children who are more likely to drink alcohol during adolescence. The child may then model the mother's and the friends' alcohol use—an outcome that seems plausible in light of the fact that adolescents tend to model the substance use behaviors of their parents and peers (Akers, Krohn, Lanza-Kaduce, & Radosevich, 1979; Bandura, 1977). No research to our knowledge has examined whether modeling mediates self-fulfilling prophecies. Accordingly, in this research we tested whether mothers' false beliefs about their children's alcohol use influenced how much alcohol mothers themselves drank in the home and also how much alcohol their children's friends drank and then tested whether mothers' and

friends' alcohol use, in turn, influenced children's subsequent alcohol use.

Overview of Current Research

In this research, we examined whether self-verification, informational conformity, and modeling processes mediate self-fulfilling prophecy effects. We tested these processes of mediation with data from two independent samples of mothers and their adolescent children in which children's alcohol use was the outcome variable. One data set provides four waves of data from a sample of 487 mothers and their children, spanning the time that children were in the 7th to the 10th grades. The other data set provides five waves of data from a sample of 287 mothers and their children, spanning the time that children were in the 6th to the 12th grades.

Several previously published studies examining the self-fulfilling prophecy process have been based on these or portions of these data (Madon, Guyll, Spoth, Cross, & Hilbert, 2003; Madon, Guyll, Spoth, & Willard, 2004; Madon, Willard, Guyll, Trudeau, & Spoth, 2006), including one that provided a preliminary test of specific behavioral mediators of mothers' self-fulfilling effects (Willard et al., in press). This lattermost study, which focused on early waves of data from one of the samples used in this research, found that children at risk for alcohol use were more susceptible to confirming their mothers' favorable versus unfavorable beliefs regarding their alcohol use. In addition, it found that this heightened susceptibility was partly due to mothers' global parenting practices and children's friends' alcohol use, both of which were identified by supplementary analyses as mediating mothers' self-fulfilling effects. These identified mediators are consistent with a taxonomy of specific behaviors hypothesized to mediate self-fulfilling prophecies in the context of the family (Harris, 1993).

The present investigation extends these prior findings by moving beyond the identification of context-specific mediators to the identification of processes that have a greater potential to mediate self-fulfilling prophecies across contexts and social relationships. Accordingly, the behaviors that we examined as potential mediators in this research were selected on the basis of the theoretically derived processes of mediation under investigation, a selection strategy that resulted in a hypothesized set of process-relevant mediators. The present investigation also makes two important methodological advances over our preliminary investigation of mediation. First, whereas our preliminary research addressed mediation with behavioral variables that were assessed at the same point in time as the outcome variable, in the present research we used a temporally sequenced set of process-relevant mediators that were assessed after mothers' beliefs and before the outcome of children's alcohol use. Therefore, we are able in the present research to rule out reverse causal relations between the hypothesized mediational processes and the outcome variable. Second, by virtue of testing the processes of mediation with data from two independent samples of mother–child dyads, each of which spans

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[1] Perceptions of correct, acceptable, or socially desirable behavior for a group are referred to as *injunctive norms*. Injunctive norms are distinct from *descriptive norms*, which are perceptions regarding how other people behave in a given situation (Cialdini, Kallgren, & Reno, 1991; Cialdini & Trost, 1998; Perkins, 2006).

multiple years of adolescence, the present research was also aptly suited to address the reliability and stability of our findings across adolescent development.

Analytic Framework: Adapted Reflection–Construction Model

The reflection–construction model (Jussim, 1991) relates perceivers' beliefs to targets' future outcomes. Figure 1 depicts an adaptation of this model showing causal relations between mothers' beliefs and children's subsequent alcohol use. However, because the data with which we examined these relations are correlational, when discussing our own data, we phrased our findings in terms of variables "predicting" rather than "causing" other variables.

Accuracy

The model proposes that background predictors of adolescent alcohol use influence both children's subsequent 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 background predictors. According to the model, therefore, the accurate portion of the relationship between mothers' beliefs and children's subsequent 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 background predictors of adolescent alcohol use. Because the accuracy-based portion of the zero-order relationship between mothers' beliefs and children's subsequent alcohol use is entirely included in the effect

represented by Path *a*, compound Path *c* + *de* represents the ability of the inaccurate portion of mothers' beliefs to influence children's subsequent alcohol use by means of a self-fulfilling prophecy (Jussim, 1991). Accordingly, in this research we operationalized self-fulfilling prophecy effects as the unique relation between mothers' beliefs and children's subsequent alcohol use after accounting for the background predictors of adolescent alcohol use, which is how it is typically done in the literature (e.g., Jussim, 1989; Jussim & Eccles, 1992; Madon, Jussim, & Eccles, 1997; Madon et al., 1998; 2001; 2003; 2006; Madon, Guyll, Spoth, & Willard, 2004; Smith, Jussim, & Eccles, 1999; Smith et al., 1998).

Background Predictors of Adolescent Alcohol Use

The accurate estimation of mothers' self-fulfilling effects on children's subsequent alcohol use depends on the quality of the background predictors included in the model. The background 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 attitudes toward alcohol use, access to alcohol, global parenting, self-assessed likelihood of drinking alcohol in the future, acceptability of adolescent alcohol use, friends' alcohol use, and past alcohol use (see Catalano & Hawkins, 1996; Gorsuch & Butler, 1976; Hawkins, Catalano, & Miller, 1992, for reviews).

Mediation

Path *de* shows the potential for self-verification, informational conformity, and modeling processes to mediate the self-fulfilling effect of mothers' beliefs on children's subsequent alcohol use.
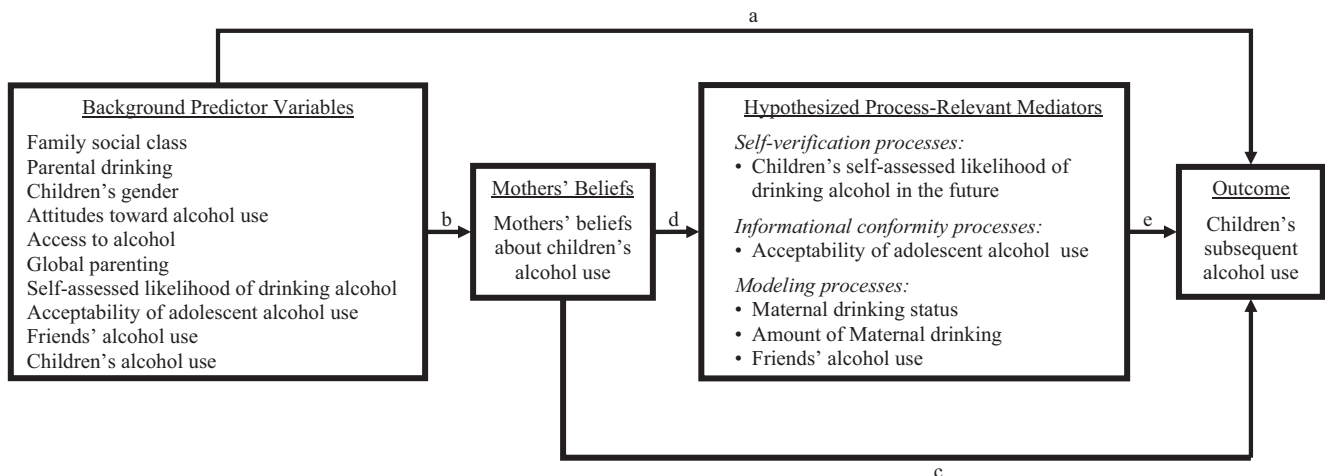
Figure 1. Adapted reflection–construction model (Jussim, 1991). This model shows relations among background predictor variables of children's alcohol use, mothers' beliefs about their children's alcohol use, and children's subsequent alcohol use. According to the model, the background predictor variables influence children's subsequent alcohol use (Path *a*) and mothers' beliefs (Path *b*). Mothers' beliefs can also influence their children's subsequent alcohol use through self-fulfilling prophecies (Path *c* + *de*). These self-fulfilling prophecy effects may be mediated by self-verification, informational conformity, and modeling processes (Path *de*).

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 the Capable Families and Youth Study (Spoth, Redmond, Trudeau, & Shin, 2002), referred to 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*.[2] Both studies sampled participants from Iowa. Analyses are based on four waves of data from 486 mother–child dyads who participated in Capable Families and on five waves of data from 287 mother–child dyads who participated in Rural Family. Only 1 child in each family provided data.

In Capable Families, mothers' average age was 39 years and children's average age was 12 years at Wave 1. There were 229 girls and 257 boys, including 473 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.

In Rural Family, mothers' average age was 38 years and children's average age was 12 years at Wave 1. There were 128 girls and 159 boys, including 279 European Americans, 1 African American, 1 Asian American, 1 Latino/Hispanic American, 3 Native Americans, and 2 children whose ethnicity was categorized as "other." 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/reduced-cost lunches) and community size (8,500 or fewer).

Procedures

Research staff interviewed parents to obtain 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 that occurred 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 makes use of variables pertaining to parents' reports of their family's social class, parents' drinking behavior, mothers' beliefs about their children's alcohol use, children's gender, children's reports of their attitudes toward alcohol use, access to alcohol, global parenting, self-assessed likelihood of drinking alcohol in the future, acceptability of adolescent alcohol use, their friends' alcohol use, and their own alcohol use. We next describe these variables in detail and provide average reliabilities across waves of data. Unless otherwise indicated, Cronbach's alpha assessed the internal consistency of the variables.

Family social class. Family social class was estimated with items that assessed family income and parental education. To assess family income, parents indicated 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. Parental education was assessed through parents' verbal report of the highest educational level or degree they had achieved. Responses were assigned a value ranging from 0 through 20 (e.g., 0 = *no education*, 12 = *high school diploma or general equivalency degree (GED)*, 16 = *bachelor's degree*, 18 = *master's degree*, 20 = *PhD, MD, or other professional degree*). Across both samples, 96% of parents 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. Parental drinking was assessed with two measures that we refer to as *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 (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, we averaged the total number of alcoholic drinks consumed by mothers and fathers to yield one score per child. At Wave 1, 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. We also calculated

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[2] Other research refers to Rural Family as Project Family.

[3] Rural Family also included a baseline assessment that occurred in 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.

mothers' responses to these items and then used them as process-relevant mediators in the analyses that tested whether informational conformity processes mediated mothers' self-fulfilling effects on their children's subsequent alcohol use. We refer to these variables as *maternal drinking status* and *amount of maternal drinking*.

Mothers' beliefs.   Mothers' beliefs about their children's alcohol use were assessed with three items: (a) "On a scale from 1 to 10, please rate how likely you think it is that your child in the study will drink alcohol regularly as a teenager?" (anchors 1 = *certain that this will not happen* through 10 = *certain that this will happen*); (b) "If your child in the study were at a party and one of his/her friends offered him/her an alcoholic beverage, how likely would your child be to just say 'no' and leave?" and (c) "If your child in the study were at a party and one of his/her friends offered him/her an alcoholic beverage, how likely would your child be to drink it?" (both with anchors 1 = *very likely* through 5 = *very unlikely*). Responses to the latter 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 → 1.00, 2 → 3.25, 3 → 5.50, 4 → 7.75, 5 → 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 was more likely to drink alcohol. The average reliability of the items across waves was .71 in both Capable Families and Rural Family.

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 school work," and (e) "Drinking alcohol makes it hard to get along with friends." Responses were assessed with a 4-point scale (anchors 1 = *definitely yes* through 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 a more favorable attitude toward drinking alcohol.

Access to alcohol.   To assess children's ability to access alcohol, children responded to the 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 (anchors 1 = *definitely yes* through 4 = *definitely no*). Responses were reverse scored so that higher values correspond to greater perceived ability to obtain alcohol.

Global parenting.   To assess parents' global parenting, we used children's responses to 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?") and parental practices regarding standard setting (e.g., "How often does your mom ask you what you think before making a decision that affects you?"), monitoring of child behavior (e.g., "How often does your mom know when you get into trouble at school or someplace else away from home?"), and 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 (anchors of 1 = *always* through 7 = *never*). The remaining items were assessed with 5-point scales (anchors of 1 = *almost always* through 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.

Self-assessed likelihood of drinking alcohol in the future.   To assess children's self-assessed likelihood of drinking alcohol in the future, we used children's responses to the following statement on a 5-point response scale (anchors 1 = *definitely yes* through 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)?" (anchors 1 = *definitely not* through 5 = *definitely yes*). For children participating in Capable Families, 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.

Acceptability of adolescent alcohol use.   Children's perceptions regarding the acceptability of 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?" (anchors 1 = *not at all wrong* through 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?" (anchors 1 = *not at all wrong* through 4 = *very wrong*). Responses to both items were reversed scored so that higher values reflect the belief that adolescent alcohol use is more acceptable. 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.

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, friends' alcohol use was assessed by asking children, "How many of your friends do you think drink alcoholic beverages?" and "How many of your friends do you think get drunk at least once a week?" Both items used a 5-point response scale (anchors 1 = *none* through 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, 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 (anchors 1 = *none of them* through 5 = *all of them*). In both samples, higher values indicate more alcohol use among friends.

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. We dichotomized responses to the open-ended items by assigning a value of 0 to children who reported no drinking and assigning a value of 1 to children who reported some amount of drinking. The remaining three items that assessed children's alcohol use differed across samples. In Capable Families, the items were: (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 (anchors 1 = *not at all* through 7 = *about every day*). We dichotomized responses to each item by assigning a value of 0 to responses indicating no drinking (i.e., responses of 1) and assigning a value of 1 to responses indicating some amount of drinking (i.e., responses of 2–7). In Rural Family, the remaining three items were: (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 using a *no–yes* format (i.e., *no* = 0, *yes* = 1). We created an alcohol use score for each child by summing the coded responses at each wave. 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 Formula 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 Issues

Residualized variables. In preparation for the main analyses, we performed a series of SAS PROC MIXED (Littell, Milliken, Stroup, & Wolfinger, 1996) procedures to create residualized variables to account for two characteristics of the data. First, the data used in this research were hierarchically structured. Children in both data sets were clustered within schools, and in Capable Families, schools were matched on variables that were expected to be related to adolescent problem behaviors (i.e., family social class, family risk, school grade structure, geographic distance of community to a city). Traditional data analytic procedures are inappropriate for hierarchically structured data because they assume independence of individual observations and, as a result, tend to underestimate standard errors and bias significance tests

toward rejection of the null hypothesis (Cochran, 1977; Kreft & de Leeuw, 1998). Second, the data were obtained from families participating in large intervention trials in which families had been randomly assigned to either a control condition or to one of two interventions designed to prevent adolescent substance use and other problem behaviors.[4] Using the SAS PROC MIXED procedures, we accounted for these characteristics of the data by removing the effects of the cluster variables and condition from all of the individual-level variables prior to performing the main analyses. Specifically, we regressed all of the background predictors (except child gender), process-relevant mediators, and outcome variables (see Figure 1) on both (a) the cluster variables and (b) the condition to which families had been assigned. These analyses were performed separately for each wave and sample, and the resulting residuals were used in all subsequent analyses.

Analytic plan. We performed path analyses using LISREL Version 8.30 (Jöreskog & Sörbom, 1999) to examine whether self-verification, informational conformity, and modeling processes mediated mothers' self-fulfilling effects on their children's subsequent alcohol use (Figure 1). For the analyses pertaining to self-verification processes, we used children's self-assessed likelihood of drinking alcohol in the future as the process-relevant mediator. For the analyses pertaining to informational conformity processes, we used children's perceptions regarding the acceptability of alcohol use among adolescents as the process-relevant mediator. For the analyses pertaining to modeling processes, we used maternal drinking status, amount of maternal drinking, and friends' alcohol use as the process-relevant mediators.

We tested the mediational processes with analytic models that were temporally structured, meaning that they used consecutive assessments of mothers' beliefs, the process-relevant mediators, and the outcome of children's alcohol use. For example, for analyses that tested for mediation with mothers' beliefs assessed at Wave 1, we used process-relevant mediators assessed at Wave 2 and used as the outcome variable children's alcohol use assessed at Wave 3. Likewise, for analyses that tested for mediation with mothers' beliefs assessed at Wave 2, we used process-relevant mediators assessed at Wave 3 and used as the outcome variable children's alcohol use assessed at Wave 4. In addition, each of these analyses included the set of background predictors of adolescent alcohol use. As shown in Figure 1, the background predictors included preceding assessments of the process-relevant mediators, thereby controlling for prior levels of these variables. In this way, we were able to examine the extent to which changes in the mediators were responsible for transmitting mothers' self-fulfilling effects on their children's subsequent alcohol use. It is also worth-

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[4] Families were assigned to one of three experimental conditions depending on the school attended by the participating child. In Capable Families, the conditions were the (a) Life Skills Training Program (LST-only), (b) LST in combination with the Strengthening Families Program 10–14 (LST + SFP10–14), and (c) a minimal contact control condition. In Rural Family, the conditions were (a) Preparing for the Drug Free Years (PDFY), (b) the Iowa Strengthening Families Program (ISFP), and (c) a no-treatment control condition. See Botvin (2000); Hawkins et al. (1988); Molgaard, Kumpfer, & Fleming (1997), and Park et al. (2000) for details about these interventions. For information about the effectiveness of these interventions, see Spoth, Randall, Shin, & Redmond (2005); Spoth, Redmond, & Shin (2001), and Spoth, Redmond, Shin, and Azevedo (2004).

Table 1

Zero-Order Correlations, Means, and Standard Deviations at Wave 1 for Capable Families (N = 486) and Rural Family (N = 287)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Family income	—	.35**	.05	.01	−.13**	.06	−.10*	−.03	.14**	−.12**	−.12**	−.12**	−.03	.08	−.06
2. Parental education	.26**	—	−.06	−.10*	−.16**	.02	−.13**	.05	.22**	−.17**	−.11*	−.09*	−.08	−.08	−.09*
3. Parental drinking status	.03	.01	—	.24**	.07	−.03	.02	.03	−.12**	.07	.04	−.02	.04	.68**	.17**
4. Amount of parental drinking	−.02	.01	.37**	—	.17**	−.00	.09*	.08	−.10*	.13**	.08	.03	.05	.22**	.74**
5. Mothers' beliefs	.02	−.12*	.02	.08	—	−.17**	.15**	.08	−.31**	.27**	.21**	.16**	.19**	.10*	.17**
6. Child gender[a]	.01	−.03	.01	.00	−.16**	—	.00	−.07	.04	.01	.03	.03	.01	−.03	−.01
7. Attitudes toward alcohol use	−.07	−.14*	.01	.07	.11	−.12*	—	.10*	−.23**	.24**	.28**	.23**	.18**	.04	.04
8. Access to alcohol	.02	.14*	.03	.00	.12*	−.12*	.06	—	−.08	.26**	.21**	.29**	.29**	.07	.04
9. Global parenting	.15*	.25**	−.04	.04	−.25**	.11	−.26**	−.09	—	−.33**	−.32**	−.20**	−.26**	−.14**	−.09
10. Self-assessed likelihood of drinking alcohol	.00	−.12*	.10	.06	.36**	−.16**	.22**	.29**	−.28**	—	.51**	.41**	.55**	.13**	.10*
11. Acceptability of adolescent alcohol use	−.02	−.05	.05	.08	.22**	−.09	.24**	.18**	−.15**	.49**	—	.40**	.43**	.09	.04
12. Friends' alcohol use	.03	.03	−.08	−.06	.11	−.10	.16**	.15*	−.19**	.31**	.25**	—	.44**	−.01	.00
13. Children's alcohol use	−.04	−.13*	.02	.02	.25**	−.01	.23**	.20**	−.19**	.40**	.34**	.41**	—	.09	.04
14. Maternal drinking status	.04	.01	.70**	.39**	.07	.03	−.07	.04	−.05	.06	.03	−.08	.02	—	.25**
15. Amount of maternal drinking	−.05	.10	.27**	.71**	.10	.01	−.02	.01	.03	.06	.10	−.03	.07	.39**	—
Capable Families															
M	44,130[b]	13.46	0.90	11.22	3.31	47%[c]	1.52	1.65	5.47	1.41	1.13	1.29	0.18	0.80	6.51
SD	23,988	1.71	0.30	15.96	1.60	—	0.54	0.98	0.76	0.69	0.34	0.60	0.74	0.40	12.63
Rural Family															
M	41,332[b]	13.82	0.71	7.48	2.39	55%[c]	1.58	1.95	5.57	1.23	1.12	1.25	0.31	0.55	3.82
SD	38,163	1.90	0.45	12.98	1.22	—	0.64	1.19	0.80	0.61	0.39	0.78	0.83	0.50	8.93

Note. All values correspond to raw score variables. Correlations above the diagonal are based on data from Capable Families. Correlations below the diagonal are based on data from Rural Family.
[a] Boys were coded as 1 and girls were coded as 2. [b] The median income of families at Wave 1 was $40,000 in Capable Families and $37,000 in Rural Family. [c] Value reflects percentage of children who were girls.
* $p \leq .05$. ** $p \leq .01$.

while to note that the background predictors used in these analyses were repeatedly updated to include assessments that were most proximal to the assessments of mothers' beliefs. For example, for analyses that used mothers' beliefs assessed at Wave 1, we used background predictors assessed at Wave 1, and for analyses that used mothers' beliefs assessed at Wave 2, we used background predictors assessed at Wave 2, and so on.

Time frames. This research examined the mediation of mothers' self-fulfilling effects across two time frames in Capable Families and across three time frames in Rural Family. Each time frame included three waves of data such that the background predictors and mothers' beliefs were assessed first, the process-relevant mediator(s) were assessed second, and the outcome of children's alcohol use was assessed third. The two time frames pertaining to Capable Families were (a) Waves 1, 2, and 3 and (b) Waves 2, 3, and 4. The three time frames pertaining to Rural Family were (a) Waves 1, 2, and 3; (b) Waves 2, 3, and 4; and (c) Waves 3, 4, and 5.

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.

Base model. For each of the five time frames under investigation, we used LISREL Version 8.30 (Jöreskog & Sörbom, 1999) to perform a path analytic base model to examine the unique and direct effect of each background predictor variable on the outcome of children's alcohol use. In each analysis, the background predictors were assessed two waves prior to the outcome of children's alcohol use (e.g., Wave 1 background predictors and Wave 3 children's alcohol use). The results indicated that the set of background predictors explained between 32% and 34% (M = 0.33) of variance in children's alcohol use in Capable Families and between 21% and 34% (M = 0.28) in Rural Family. In addition, as shown in Table 2, each of the following predictor variables had a significant direct effect on children's alcohol use across at least one time frame: parental education, amount of parental drinking, access to alcohol, global parenting, self-assessed likelihood of drinking alcohol in the future, acceptability of adolescent alcohol use, and children's (previous) alcohol use, |βs| ≥ .08, ps ≤ .05.

Self-fulfilling prophecy. We next tested for a self-fulfilling prophecy effect at each time frame. These analyses were identical to the path analytic base models described in the previous section except that mothers' beliefs were added as a predictor variable. As indicated in Table 2, the data were consistent with a self-fulfilling prophecy: Mothers' beliefs significantly predicted the outcome of children's alcohol use at three of the five time frames considered, βs ≥ .09, ps ≤ .05, and marginally significantly predicted the outcome (in the expected direction) in the other two, βs ≥ .07, ps ≤ .10. These particular self-fulfilling prophecy effects largely replicate findings previously reported using these same data (Madon et al., 2003, 2006; Madon, Guyll, Spoth, & Willard, 2004;

Table 2
Direct Effects of the Background Predictors, Mothers' Beliefs, and the Process-Relevant Mediators on the Outcome of Children's Alcohol Use

Variables	Capable Families (N = 486) Time frames		Rural Family (N = 287) Time frames		
	Waves 1, 2, & 3	Waves 2, 3, & 4	Waves 1, 2, & 3	Waves 2, 3, & 4	Waves 3, 4, & 5
Background predictors					
Family income	−.04	−.04	.01	.01	.02
Parental education	−.08*	−.06	−.08	−.11*	−.08
Parental drinking status	.01	.02	.00	.03	.08
Amount of parental drinking	.06	.13**	.07	.04	.04
Child gender	.01	.05	.08	.01	.08
Attitudes toward alcohol	.02	.07	.01	.08	−.04
Access to alcohol	.07†	.19**	.25**	.02	.17**
Global parenting	−.03	−.07	−.11*	−.05	−.07
Self-assessed likelihood of drinking alcohol	.26**	.40**	.11†	.01	.06
Acceptability of adolescent alcohol use	−.04	−.14*	.04	.12	.15*
Friends' alcohol use	−.01	.03	−.03	.06	.01
Children's alcohol use	.32**	.08	.34**	.25**	.21**
Mothers' beliefs	.09*	.07†	.11*	.10†	.13*
Process-relevant mediators					
Self-assessed likelihood of drinking alcohol	.42**	.44**	.27**	.27**	.40**
Acceptability of adolescent alcohol use	.27**	.18**	.23**	−.27**	−.40**
Maternal drinking status	.02	−.02	.04	.08	.13†
Amount of mothers' drinking	.05	.09†	.08	.12†	.09
Friends' alcohol use	.28**	.13**	.24**	.11†	.29**

Note. Beta values are the direct effect of each variable on the outcome of children's alcohol use. For each time frame, the background predictors and mothers' beliefs were assessed at the first wave listed (e.g., Wave 1), the process-relevant mediators were assessed at the second wave listed (e.g., Wave 2), and the outcome of children's alcohol use was assessed at the third wave listed (e.g., Wave 3).
† $p \leq .10$ * $p \leq .05$.   ** $p \leq .01$.

Willard et al., in press) but are important in the present context because they establish the appropriateness of conducting mediation analyses.

Main Analyses

Having established the occurrence of self-fulfilling prophecy effects in these data, we next examined whether self-verification, informational conformity, and modeling processes mediated these effects. We performed three sets of path analyses using LISREL Version 8.30 (Jöreskog & Sörbom, 1999), one for each of the mediational processes being considered. These analyses included the background predictor variables, mothers' beliefs, the hypothesized process-relevant mediator(s), and the outcome of children's alcohol use. In each analysis performed, the existence of a significant indirect effect of mothers' beliefs on the outcome of children's alcohol use via the potential mediator (i.e., Path *de* in Figure 1) would support the hypothesized mediational process. We next describe these analyses and their corresponding results.

Self-verification. According to the self-verification hypothesis, mothers' false beliefs about their children's alcohol use alter how likely children believe they themselves are to drink alcohol, and these altered assessments of the self influence how much alcohol children drink subsequently. We tested the self-verification hypothesis five times, once for each of the time frames considered. Consistent with the self-verification hypothesis, results indicated that the indirect effect of mothers' beliefs on children's alcohol use through children's self-assessed likelihood of drinking alcohol in

the future attained significance in four of the five tests of mediation that we performed (Table 3). These significant indirect effects occurred across both time frames in the Capable Families data, $\beta s \geq .03$, $ps \leq .05$, and across two of the three time frames in the Rural Family data, $\beta s \geq .05$, $ps \leq .05$. These results are consistent with the self-verification hypothesis that mothers' self-fulfilling effects occurred because children internalized their mothers' false beliefs about their alcohol use and then engaged in behaviors that served to verify those internalized beliefs, thereby causing them to come true.

Informational conformity. According to the informational conformity hypothesis, mothers' false beliefs about their children's alcohol use alter how acceptable children believe alcohol use is among adolescents, and these altered perceptions influence how much alcohol children drink subsequently. We tested the informational conformity hypothesis for each of the five time frames considered. Results indicated that the indirect effect of mothers' beliefs on children's alcohol use via children's perceptions regarding the acceptability of adolescent alcohol use achieved significance across one time frame in the Capable Families data, $\beta = .02$, $p < .05$, across one time frame in the Rural Family data, $\beta = .03$, $p < .05$, and achieved marginal significance across a second time frame in the Rural Family data, $\beta = .04$, $p < .10$ (Table 3). These findings provide moderate support for the informational conformity hypothesis that mothers' false beliefs shaped their children's perceptions regarding the acceptability of adolescent alcohol use, perceptions to which their children then conformed, thereby leading them to confirm their mothers' initially false beliefs.

Table 3
Indirect Effects of Mothers' Beliefs on the Outcome of Children's Alcohol Use Through Each Hypothesized Process-Relevant Mediator

	Capable Families ($N = 486$) Time frames		Rural Family ($N = 287$) Time frames		
Process-relevant mediators	Waves 1, 2, & 3	Waves 2, 3, & 4	Waves 1, 2, & 3	Waves 2, 3, & 4	Waves 3, 4, & 5
Self-assessed likelihood of drinking alcohol in the future	.03[*]	.04[*]	.05[**]	.01	.06[*]
Acceptability of adolescent alcohol use	.00	.02[*]	.03[*]	−.01	.04[†]
Maternal drinking status	.00	.00	.00	.00	.00
Amount of mothers' drinking	.00	.01	.00	.02	.00
Friends' alcohol use	.01	.01	.03[*]	−.01	.06[**]

Note. Beta values are the indirect effect of mothers' beliefs on the outcome of children's alcohol use through each hypothesized process-relevant mediator. For each time frame, the background predictors and mothers' beliefs were assessed at the first wave listed (e.g., Wave 1), the process-relevant mediators were assessed at the second wave listed (e.g., Wave 2), and the outcome of children's alcohol use was assessed at the third wave listed (e.g., Wave 3). Self-assessed likelihood of drinking alcohol was used to test whether self-verification processes mediated mothers' self-fulfilling effects. Acceptability of adolescent alcohol use was used to test whether informational conformity processes mediated mothers' self-fulfilling effects. Maternal drinking status, amount of maternal drinking, and friends' alcohol use were used to test whether modeling processes mediated mothers' self-fulfilling effects.
[†] $p \leq .10$.   [*] $p \leq .05$.   [**] $p \leq .01$.

Modeling. According to the modeling hypothesis, mothers' false beliefs about their children's alcohol use alter how much alcohol mothers themselves drink and also how much alcohol their children are exposed to via friends as a result of the friendships that mothers' encourage their children to develop. These alcohol use behaviors are then modeled by children, thereby leading them to confirm their mothers' initially false beliefs. Because there were three process-relevant mediators pertaining to modeling—maternal drinking status, amount of maternal drinking, and friends' alcohol use—and five time frames under consideration, we tested the modeling hypothesis a total of 15 times. Five analyses tested whether maternal drinking status mediated mothers' self-fulfilling effects. Five other analyses tested whether the amount of maternal drinking mediated mothers' self-fulfilling effects. The remaining five analyses tested whether friends' alcohol use mediated mothers' self-fulfilling effects. Results indicated that the indirect effect of mothers' beliefs on children's alcohol use through maternal drinking status and the amount of maternal drinking never achieved significance, all $\beta s \leq .02$, $ps > .05$. In contrast, the indirect effect of mothers' beliefs on children's alcohol use through friends' alcohol use was statistically significant across two of the five tests of mediation that we performed, both occurring in the Rural Family data, $\beta s \geq .03$, $p < .05$. These findings provide some support for the modeling hypothesis that mothers' false beliefs shaped their children's alcohol use by way of influencing how much alcohol their children were exposed to by friends, whose behavior their children then modeled.

Independence of Mediational Processes

The analyses presented thus far yielded the greatest support for the self-verification hypothesis. Across both data sets, children's self-assessed likelihood of drinking alcohol in the future consistently mediated the relationship between mothers' beliefs and children's subsequent alcohol use. To ensure that this pattern was independent from the mediational processes of informational conformity and modeling, both of which also received some empirical support, we performed one final set of analyses. This final set included three path analyses, one for each time frame in which

multiple mediational processes were supported by the data. We performed these analyses in Mplus (Muthén, & Muthén, 2005) because of its capacity to test specific indirect effects (Muthén, & Muthén, 2005, pp. 421–423). Specific indirect effects are that part of an indirect effect that is transmitted specifically by a particular path or combination of paths (see Bollen, 1987, p. 55). In our analyses, each specific indirect effect corresponds to the effect of mothers' beliefs on children's alcohol use through a single process-relevant mediator. Each analysis included the background predictor variables, mothers' beliefs, all of the process-relevant mediators that our previous analyses had shown to achieve significance at that particular time frame, and the outcome of children's alcohol use. Mirroring the findings of our main analyses, the results of these analyses provided consistent support for the self-verification hypothesis. The specific indirect effect of mothers' beliefs on children's alcohol use through children's self-assessed likelihood of drinking alcohol in the future was significant in each analysis performed, $\beta s \geq .03$, $ps \leq .05$. Less support, by contrast, was found for the mediational processes of informational conformity and modeling. The specific indirect effect of mothers' beliefs on children's alcohol use through children's perceptions regarding the acceptability of adolescent alcohol use did not achieve significance in any analysis performed, $\beta s \leq .02$, $ps > .05$, and the specific indirect effect of mothers' beliefs on children's alcohol use through children's friends' alcohol use achieved significance in only one analysis performed, $\beta = .03$, $p < .05$.

Discussion

The goal of this research was to identify processes that mediate self-fulfilling prophecy effects. Toward this end, we tested whether self-verification, informational conformity, and modeling processes mediated mothers' self-fulfilling effects on their children's alcohol use. The data with which we tested these mediational processes were obtained from two independent samples of mothers and their adolescent children, each spanning multiple years of adolescence. Results provided the clearest support for self-verification processes as a mediator of mothers' self-fulfilling effects. Across both samples and across multiple years, the data

yielded a significant indirect effect of mothers' beliefs on children's alcohol use through children's self-assessed likelihood of drinking alcohol in the future. In addition, this pattern held even when analyses controlled for the process-relevant mediators pertaining to informational conformity and modeling processes. The results provided more equivocal support for informational conformity and modeling processes as mediators of mothers' self-fulfilling effects. Initially, the indirect effect of mothers' beliefs on their children's alcohol use through (a) children's perceptions regarding the acceptability of adolescent alcohol use (informational conformity) and (b) children's friends' alcohol use (modeling) were each significant across multiple time frames. However, these significant effects were either completely eliminated or reduced in number when the analyses simultaneously included all of the process-relevant mediators that had achieved significance across a given time frame. Before discussing the importance of these findings, we first address general issues involved in the interpretation of findings from correlational designs and the relevance of those issues to the present research.

Interpreting Correlational Data

There are several advantages to using correlational designs to study self-fulfilling prophecy effects. For example, correlational designs enable researchers to examine whether perceivers' beliefs have self-fulfilling effects on important target outcomes such as drug use and academic achievement without raising ethical considerations. They also make it possible to address how and to what extent self-fulfilling prophecy effects operate within naturally occurring social relationships in which perceivers typically have at least some valid information about targets on which to base their beliefs (Madon et al., 1998; 2001). However, correlational designs also have several limitations. Most notably, 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(s) caused changes in the dependent variable, the dependent variable caused changes in the predictor variable(s), or a third variable caused changes in both the predictor and dependent variables. Although longitudinal designs, such as the one used in this research, do rule out reverse causal relations between the predictor and dependent variables, they do not rule out the possibility that a third, unmeasured variable was responsible for changes in both the predictor and dependent variables.

The potential omission of a background predictor variable is a limitation that characterizes all correlational 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 background predictor variable raises the possibility that mothers based their beliefs on a background predictor of adolescent alcohol use that was not included in the analytic models. If this happened, then mothers' beliefs were more accurate than estimated, and their self-fulfilling effects were smaller than reported. Accordingly, an omitted variable explanation for the relations between mothers' beliefs and children's alcohol use is an accuracy alternative to our self-fulfilling prophecy explanation. Although we cannot completely rule out accuracy as an alternative explanation for these relations, there are several reasons why we believe a self-fulfilling prophecy interpretation is more tenable.

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; see Snyder, 1984, 1992; Snyder & Stukas, 1999, for reviews). 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 background predictors of adolescent alcohol use. The background predictors that we included comprised a wide range of constructs that were selected on the basis of an extensive body of research relevant to alcohol use among adolescents (see Catalano & Hawkins, 1996; Hawkins et al., 1992, for reviews). The inclusion of these background predictors reduced the likelihood that an unmeasured third variable produced the observed relations between mothers' beliefs and children's alcohol use. Indeed, the background predictors that were included in the analytic models explained, on average, 30% of the variance in children's alcohol use, which matches the amount that is typically accounted for when predicting similar outcomes (Reid, 1991; Spoth, 1997). The fact that the background predictors explained this amount of variance in children's alcohol use over a span of 1.5–2.0 years is noteworthy.

Third, previously published articles based on the data used in this research or portions thereof have failed to find empirical support for accuracy explanations pertaining to a variety of relations involving mothers' beliefs and children's alcohol use. For example, using the same samples as we used in this research, Madon et al. (2006) empirically addressed the accuracy of mothers' beliefs by examining whether mothers' beliefs predicted children's alcohol use because they had acted as a proxy for some unmeasured (accurate) background predictor variable(s). Madon et al. (2006) reasoned that if mothers' beliefs had been a proxy for some unmeasured background predictor, then the pattern of variance that mothers' beliefs explained in children's alcohol use over time would be similar to the pattern explained by the measured background predictors. However, analyses that examined these patterns of explained variance over time did not support an accuracy explanation of the data. Whereas mothers' beliefs tended to explain greater amounts of variance in children's alcohol use over time, the measured background predictors tended to explain smaller amounts of variance in children's alcohol use over time. This pattern of divergence occurred across all of the waves in both data sets. (Additional information about this and other internal analyses relevant to the viability of accuracy explanations for relations between mothers' beliefs and children's alcohol use observed in these data are available in Madon et al., 2003, 2006; Madon, Guyll, & Spoth, 2004; Madon, Guyll, Spoth, & Willard, 2004; and Willard et al., in press.)

In addition, in the present research, the data were only interpreted as indicating the mediation of self-fulfilling prophecies to the extent that mothers' beliefs had an indirect effect on the outcome of children's alcohol use through one of the process-relevant mediators. This means that if a background predictor

variable had been omitted from the analytic models, to the degree that it correlated with mothers' beliefs, that accuracy-related portion of the relation between mothers' beliefs and the outcome of children's alcohol use would have been captured entirely by the direct effect between these variables (i.e., Path *c* in Figure 1; Jussim, 1991).

However, it is also possible that the analytic models omitted a variable that both correlated with mothers' beliefs and had a causal effect on the mediational processes that we tested. In this case, the effect that mothers' beliefs had on the mediational processes would have been overestimated, raising the possibility that mothers' self-fulfilling effects could have been smaller than suggested. Although we cannot rule out this possibility, the convergence of our findings with those from the experimental literature, coupled with the strong set of background predictors of adolescent alcohol use that was used in the analytic models and the lack of support for accuracy explanations to account for the relations between mothers' beliefs and children's alcohol use in these data, lead us to conclude that the occurrence of self-fulfilling prophecies is the more likely explanation of the observed relations. Next, therefore, we discuss the theoretical and practical implications of our findings.

Mediational Processes of Self-Fulfilling Prophecy Effects

A self-fulfilling prophecy begins with a perceiver holding a false belief about a target and ends with the target confirming that false belief, thereby making it come true. This process is well documented in the empirical literature and has been implicated in a diverse set of outcomes including student achievement, academic and income inequalities among demographic groups, war and conflict, stock market fluctuations, business productivity, the quality of health care, and the longevity of close relationships (Blanck, 1993; Jussim, Eccles, & Madon, 1996; Snyder & Stukas, 1999). The causal path linking perceivers' false beliefs to targets' outcomes has been a primary interest of behavioral scientists for nearly 60 years and is the focus of numerous studies and meta-analytic investigations (see Brophy, 1983; Harris & Rosenthal, 1985; Rosenthal, 1973, 1981, for reviews).

A particular strength of this literature is that it has served to clarify the self-fulfilling prophecy process by identifying specific behaviors that mediate perceivers' self-fulfilling effects. Because the bulk of this literature has focused on teacher–student relations, it has provided the greatest amount of knowledge regarding behaviors that mediate teachers' self-fulfilling effects on students' achievement in classroom settings (Brophy, 1983; Harris & Rosenthal, 1985; Rosenthal, 1973). Less understood, by contrast, are general processes that mediate self-fulfilling prophecy effects. We attempted to address this latter issue in the present research and drew upon research relevant to self-verification, informational conformity, and modeling to derive our hypotheses.

The analyses yielded the greatest support for the hypothesis that self-verification processes mediated mothers' self-fulfilling effects. In both samples and across several years of adolescence, children's self-assessed likelihood of drinking alcohol in the future significantly mediated the relation between mothers' beliefs and children's alcohol use. This finding supports prior

theorizing about the self-fulfilling prophecy process by providing evidence consistent with the interpretation that children (at least partly) internalized their mothers' false beliefs about them and then verified those internalized beliefs through their subsequent alcohol use. This finding also supports and extends the results of prior experimental work. Snyder and Swann (1978) showed that targets continued to exhibit behaviors that had previously been elicited by a self-fulfilling prophecy when they had been experimentally led to internalize that behavior into their self-concepts. Our research provides the first evidence that a similar process occurs in the naturalistic environment wherein targets naturally internalize others' false beliefs about them, thereby enabling perceivers' self-fulfilling effects to produce long-lasting changes in targets' behavior.

Magnitude and Importance of Effects

Although our findings indicated that mothers had self-fulfilling effects on their children's alcohol use that were mediated by self-verification processes, these effects were relatively small. One way to understand the magnitude of these effects is to examine the standardized coefficients that correspond to them. The average magnitude of mothers' self-fulfilling effects across the five waves of data was .10 in terms of a standardized coefficient (Table 2). This effect is at the low end when compared with the typical self-fulfilling prophecy effect reported in the literature (.10–.30; Jussim, 1991; also see Madon et al., 2003). In addition, the portion of mothers' self-fulfilling effects that was mediated by self-verification processes was, on average, .04 in terms of a standardized coefficient (Table 3). This effect indicates that self-verification processes mediated, on average, 40% of mothers' total self-fulfilling effect on children's alcohol use (i.e., .04/.10 = .40). Though this is a moderately substantial portion to mediate, it is important to keep in mind that it is 40% of a small effect.

Another way to understand the magnitude of the effects we observed is to translate them back into the alcohol use scale that we used to assess children's alcohol use. As noted in the Method section, we assessed children's alcohol use with five dichotomously scored items, each corresponding to a different alcohol use behavior. For each item, a score of 0 indicated no drinking and a score of 1 indicated some amount of drinking. We summed across these five items to create an alcohol use scale that could range from 0 to 5. The self-fulfilling prophecy effects that we observed translate into 16% of children, on average, reporting a 1-point change on this scale for every 1 standard deviation change in mothers' beliefs. In other words, for every 1 standard deviation increase in mothers' beliefs, 16% of children reported a "yes" response to one additional question on the alcohol use scale. For instance, in addition to what they would have otherwise reported, these children might now also have reported that they had consumed alcohol without a parent's permission (or that they had now also gotten drunk or that they had now also consumed three or more drinks in a row within the past month). Likewise, for every 1 standard deviation decrease in mothers' beliefs, 16% of children reported a "no"

response to one additional question on the alcohol use scale.[5] The fact that self-verification processes mediated 40% of these self-fulfilling effects means that for every 1 standard deviation change in mothers' beliefs, 6% of children reported a 1-point change in their alcohol use score due to mothers' beliefs altering their self-assessed likelihood of drinking alcohol in the future (i.e., $.04 \times .16 = .06$).

Even though these effects are relatively small, we believe they are important for several reasons. First, children who initiate alcohol 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). Second, our findings provide evidence that despite the increasing influence of peers during adolescent development (Catalano & Hawkins, 1996), parents can have important socializing influences on their children's alcohol use by altering children's own beliefs about their likelihood of drinking alcohol in the future. Third, even small self-fulfilling prophecy effects can become relatively powerful by virtue of their capability to accumulate over time (Madon et al., 2006) and across perceivers (Madon, Guyll, Spoth, & Willard, 2004). As accumulation occurs, a larger total self-fulfilling effect is created, and there is more opportunity for any process to mediate it. With respect to our findings, this means that as mothers' total self-fulfilling effects become larger through accumulation, there is more of a self-fulfilling prophecy effect for self-verification processes to mediate. This is true even if the degree to which self-verification processes are operating remains at 40% because mediating 40% of a relatively large effect is objectively greater than mediating 40% of a relatively small one.

Our findings also have important practical implications with respect to the prevention of adolescent alcohol use. The findings showing that mothers' beliefs about their children's alcohol use predicted their children's self-assessed likelihood of drinking alcohol in the future may help to explain one reason that family preventive interventions have positive effects on youth—they emphasize the need for parents to clearly and consistently communicate to their adolescents that they expect them to exhibit responsible alcohol use behaviors. In addition, the finding that children's self-views mediated the effects of mothers' false beliefs on their alcohol use supports the effectiveness of family preventive interventions that target that aspect of adolescents' self-concept that specifically concerns alcohol use, with the goal of inoculating adolescents from the effect of unfavorable parental beliefs in those cases in which unfavorable beliefs are held (Madon, Guyll, Spoth, & Willard, 2004).

Other Processes of Mediation: Informational Conformity and Modeling

In contrast to the consistent support that was found for self-verification processes mediating mothers' self-fulfilling effects, comparatively less support was found for informational conformity and modeling processes doing so. Initially, the results suggested that both children's perceptions regarding the acceptability of adolescent alcohol use and their friends' alcohol use significantly mediated mothers' self-fulfilling effects on children's alcohol use across multiple time frames. However, when analyses

simultaneously included all of the significant process-relevant mediators across these time frames, the significance of these effects was completely eliminated for the process-relevant mediator of children's perceptions regarding the acceptability of adolescent alcohol use (informational conformity) and was reduced in number to only one significant effect for the process-relevant mediator of friends' alcohol use (modeling). On the basis of these findings, we conclude that (a) the initial support that was found for informational conformity processes mediating mothers' self-fulfilling effects was due to overlap between children's perceptions regarding the acceptability of adolescent alcohol use and the other significant process-relevant mediators (i.e., children's self-assessed likelihood of drinking alcohol in the future and friends' alcohol use) but that (b) modeling processes may have played some independent role in the mediation of mothers' self-fulfilling effects on their children's alcohol use. Several points regarding these findings are worth noting.

First, even though the findings of this study suggest that informational conformity and modeling processes did not play a large role in the mediation of mothers' self-fulfilling effects, it is entirely possible that these processes may mediate self-fulfilling prophecy effects to a greater extent in other contexts and within other social relationships.

Second, to the extent that modeling processes did mediate mothers' self-fulfilling effects in these data, we suspect that it occurred not because mothers influenced the alcohol use of the children with whom their children were friends but rather because mothers influenced their children's choice of friends. Mothers who believed that their children were unlikely to drink alcohol may have encouraged and facilitated their children's participation in a variety of normative activities, such as sports, band, theater, and summer camp to a greater extent than mothers who believed that their children were more likely to drink alcohol. Because activities of this sort are typically structured and monitored by responsible adults, participating children may have had fewer opportunities to develop and maintain friendships that encourage alcohol use (Catalano & Hawkins, 1996). In this way, mothers' false beliefs may have influenced the way in which they structured their children's free time, which, in turn, could have affected the friendships that their children formed, thereby ultimately affecting their children's subsequent alcohol use. This interpretation is consistent

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[5] We used the following procedure to translate the magnitude of the self-fulfilling prophecy effects that we observed back into the alcohol use scale that we used to assess children's alcohol use. First, we obtained the unstandardized coefficients associated with mothers' beliefs from the five analyses that tested for self-fulfilling prophecy effects (bs = 0.07, 0.07, 0.14, 0.14 and 0.17, respectively). Second, we multiplied each of these coefficients by the standard deviation of mothers' beliefs as measured in each corresponding analysis (SDs = 1.56, 1.72, 1.20, 1.34, and 1.47, respectively). These five products are the unstandardized effects on children's alcohol use that are predicted to result from a 1 standard deviation change in mothers' beliefs. Third, we averaged these five products to obtain the average predicted change in children's alcohol use for every 1 standard deviation change in mothers' beliefs, which was approximately equal to 0.16. In reality, however, no individual child could change by 0.16 points on the alcohol use scale because a child's score on the scale could only change in increments of 1 point. Therefore, we converted the effect into the percentage of children whose alcohol use would need to increase by 1 point in order for the average effect to equal 0.16, which corresponds to 16% of children.

with the idea that parents' beliefs are transmitted to children through their enactment of parenting behaviors—behaviors that serve to increase the likelihood that children will behaviorally confirm their parents' initially false beliefs (Harris, 1993).

Third, the findings of this study should in no way be interpreted as weak support for informational conformity and modeling processes in general. The present research focused narrowly on the involvement of these processes in the mediation of self-fulfilling prophecy effects. Indeed, informational conformity and modeling processes were clearly supported in these data: As indicated in Table 2, the acceptability of adolescent alcohol use and friends' alcohol use each directly predicted the outcome of children's alcohol use across multiple time frames, $\beta s \geq .13$, $ps \leq .01$. These results echo the large body of empirical research supporting the processes of informational conformity and modeling.

Conclusion

This research examined whether self-verification, informational conformity, and modeling processes mediated self-fulfilling prophecy effects. The data yielded the greatest support for self-verification processes as a mediator. The effects corresponding to this mediational process, though small in magnitude, occurred across multiple time frames in both samples. Accordingly, the data suggested that mothers' self-fulfilling effects occurred, in part, because children first internalized their mothers' false beliefs about their likelihood of drinking alcohol in the future and then self-verified those internalized beliefs through their subsequent alcohol use. Although we observed self-verification processes operating in the context of the mother–child relationship, self-views are often regarded as predictors of important outcomes across domains (for a review, see Swann, Chang-Schneider, & Larsen McClarty, 2007). To the extent that this is the case, our findings raise the possibility that the tendency for self-verification processes to mediate self-fulfilling prophecy effects could reflect a general process that might operate in other contexts and social relationships. For example, teachers' false beliefs about students may partly shape students' educational and occupational opportunities by altering students' views about their own academic ability. Likewise, employers' false beliefs about workers may partly shape workers' job performance by altering workers' views about their own job-related competencies. These possibilities are consistent with a long history of theorizing about the mechanisms through which perceivers' false beliefs about targets are confirmed and provides the first empirical evidence that such a mechanism can produce long-lasting effects on important target outcomes.

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