

Research Article

Self-Fulfilling Prophecies

The Synergistic Accumulative Effect of Parents' Beliefs on Children's Drinking Behavior

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ABSTRACT—*This research examined whether mothers' and fathers' beliefs about their children's alcohol use had cumulative self-fulfilling effects on their children's future drinking behavior. Analyses of longitudinal data acquired from 115 seventh-grade children and their mothers and fathers were consistent with synergistic accumulation effects for negative beliefs: Parents' beliefs predicted the greatest degree of confirmatory behavior from children when both mothers and fathers overestimated their children's alcohol use. Results did not support synergistic accumulation effects for positive beliefs: Children predicted future alcohol use was similar regardless of whether one parent or both underestimated their child's alcohol use. These findings suggest that the generally small self-fulfilling effects reported in the literature may underestimate the power of negative self-fulfilling prophecies to harm targets because studies have not taken into consideration the possibility that negative self-fulfilling prophecies may be more likely than positive ones to accumulate across multiple perceivers.*

Psychology has long emphasized the power of beliefs to shape reality (e.g., Jones, 1990; Klein & Snyder, 2003; Rosenthal & Jacobson, 1968; Snyder, 1984, 1992; Snyder & Stukas, 1999; Steele, 1997). Consistent with this tradition, Merton (1948) introduced the term *self-fulfilling prophecy* to refer to a false belief that leads to its own fulfillment. He proposed that self-fulfilling prophecies have the potential to produce profound social problems, including economic downturns, unfair labor practices, and discriminatory policies. Research bearing on Merton's analysis has clearly supported the existence of self-fulfilling prophecies (Harris & Rosenthal, 1985; Rosenthal & Jacobson, 1968; Rosenthal & Rubin, 1978; Snyder, Tanke, &

Berscheid, 1977; Swann & Ely, 1984), but has not supported his suggestion that self-fulfilling prophecies are powerful (Jussim, 1989, 1991; Jussim & Eccles, 1992, 1995; Jussim, Eccles, & Madon, 1996). Standardized regression coefficients for naturally occurring relations between perceivers' beliefs and targets' future outcomes rarely exceed .2 after relevant control variables have been taken into account (Jussim, 1991).

It is now well established that the effects of naturally occurring self-fulfilling prophecies are generally small in magnitude. However, this does not mean that self-fulfilling prophecies are never powerful. In a typical day, a target interacts with many different perceivers, each of whom may hold an inaccurate belief about the target that may have a self-fulfilling effect on the target's outcomes. When the inaccurate beliefs that different perceivers hold about a given target are similar, their individual self-fulfilling effects can accumulate such that their combined self-fulfilling influences may be more powerful than any of their individual self-fulfilling influences. That is, the similar and inaccurate beliefs held by multiple perceivers may potentiate one another's self-fulfilling effects, a process that we refer to as *synergistic accumulation*.¹

The idea that multiple perceivers' self-fulfilling prophecies might have cumulative effects runs throughout the social psychological literature. Most often, this process has been discussed with respect to social stereotypes (Jones, 1990; Klein & Snyder, 2003; Snyder, 1984). Because social stereotypes are consensually shared, many different perceivers may hold similar beliefs for members of stereotyped groups. To the extent that these stereotype-based beliefs are inaccurate for a particular target, each perceiver has the potential to exert a self-fulfilling prophecy effect that may combine with the self-fulfilling prophecy effects of other perceivers' stereotype-based beliefs to ultimately have a powerful influence on the target's behavior. Social stereotypes are one example of consensually shared beliefs. The process of synergistic accumulation applies more

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¹We thank Lee Jussim for suggesting this term.

broadly to include any inaccurate belief shared by two or more perceivers.

OVERVIEW

Although the psychological literature has long recognized the potential for self-fulfilling prophecies to accumulate across perceivers, this process has not yet been tested empirically. Therefore, the current study tested whether the self-fulfilling effects of different perceivers have cumulative influences on a target's future outcomes. We examined this process within the context of the parent-child relationship, with children's future alcohol use as the outcome variable of interest. There are several reasons why this context is useful for addressing our research question. First, mothers and fathers may hold similar beliefs about a variety of issues, including their child's alcohol use. Second, parents' beliefs about their child's alcohol use may, to a large extent, be inaccurate by virtue of having been influenced by biased information processing strategies (e.g., wishful thinking) or by invalid information about their child's risk for alcohol use (e.g., the child's report of alcohol use to the parents). Finally, the parent-child relationship is enduring and characterized by a high degree of interpersonal interaction, qualities that should facilitate the occurrence of self-fulfilling prophecies.

THEORETICAL FRAMEWORK

The reflection-construction model (Jussim, 1991) relates perceivers' beliefs to targets' future outcomes. Figure 1 presents an adaptation of this model showing relations between parents' beliefs and children's future alcohol use. We describe relations with causal language wherever the model proposes causal relations to exist. However, because the data with which we ex-

amined these relations were correlational, when discussing our own data we phrase the relations in terms of predictions, rather than causation.

Predictive Accuracy

The model assumes that risk and protective factors for adolescent alcohol use can influence both children's future alcohol use (Path a) and parents' beliefs about their children's future alcohol use (Paths b and c). Parents' beliefs are assumed to be accurate to the extent that they are predicted by these risk and protective factors. According to the model, therefore, the accurate portion of the relation between parents' beliefs and children's future alcohol use is entirely contained in the effect represented by Path a.

Self-Fulfilling Prophecies

Only the inaccurate portion of a belief can be self-fulfilling. The model defines parents' beliefs as being inaccurate to the extent that they are not based on risk and protective factors for adolescent alcohol use. Because the accuracy-based portion of the zero-order relationship between parents' beliefs and children's future alcohol use is entirely included in the effect represented by Path a, Paths d and e represent the ability of the inaccurate portion of parents' beliefs to influence children's future alcohol use via self-fulfilling prophecies.

Risk and Protective Factors

The accurate estimation of parents' self-fulfilling influences on children's future alcohol use depends on the predictive accuracy of the risk and protective factors included in the model. The risk and protective factors used in this research tap a wide

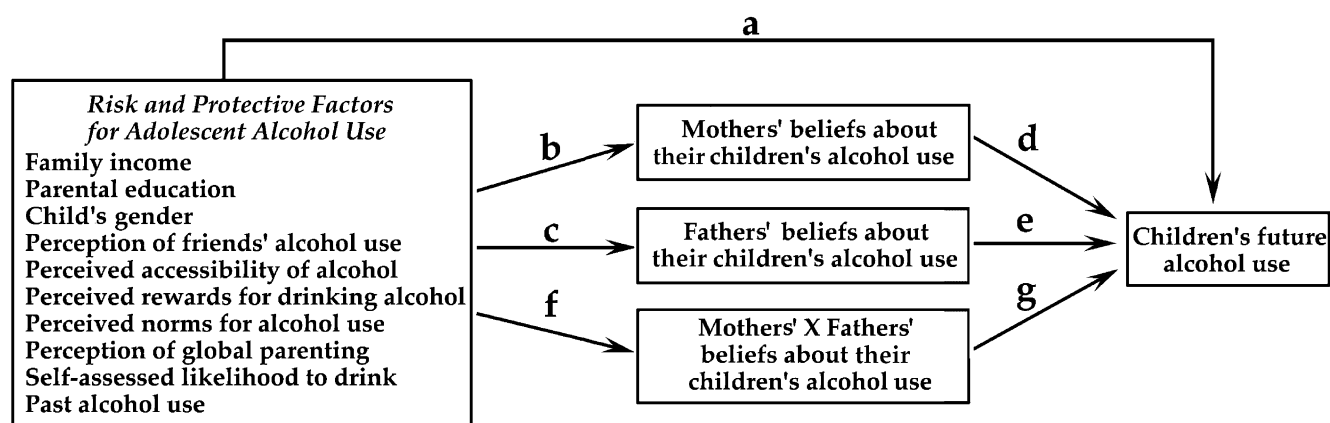


Fig. 1. Adaptation of the reflection-construction model (Jussim, 1991) showing potential relations among risk and protective factors for adolescent alcohol use, mothers' and fathers' beliefs about their children's alcohol use, and children's future alcohol use. According to the model, children's risk and protective factors influence children's future alcohol use (Path a) and parents' beliefs about their children's alcohol use (Paths b and c). Parents' beliefs can also influence their children's future alcohol use through self-fulfilling prophecies (Paths d and e). The individual self-fulfilling effects that mothers and fathers have on their children's future alcohol use can accumulate if their beliefs moderate one another's effects on the outcome. This moderation effect is captured as the product of mothers' and fathers' beliefs. The degree to which this product term is predicted by children's risk and protective factors is reflected by Path f. The synergistic accumulation of self-fulfilling prophecy effects stemming from this moderation is modeled by Path g.

range of constructs relevant to children's alcohol use, and were selected because of their influence on the initiation of substance use as proposed by the social development model (Catalano & Hawkins, 1996). This model provides a comprehensive framework that characterizes an array of processes and factors that can influence the development and progression of delinquent behavior in youth. It specifies pro- and antisocial pathways that can simultaneously affect adolescents' drug use and delinquency. The social development model is based on a large body of empirical evidence that demonstrates the relationship of parenting behaviors, parent-child bonding, and peer associations with early substance use and other problem behaviors (Catalano & Hawkins, 1996; Dishion, Patterson, Stoolmiller, & Skinner, 1991). Thus, the current study includes a comprehensive set of predictors of adolescent alcohol use that have both theoretical and empirical support.

Synergistic Accumulation

The individual self-fulfilling prophecy effects of multiple perceivers can accumulate if the perceivers' beliefs moderate one another's effects on the outcome. For example, a mother who overestimates how much alcohol her child drinks may elicit a greater degree of confirmatory behavior from her child if the child's father also overestimates the child's alcohol use.² Figure 1 depicts this moderation effect as the product of mother's and father's beliefs. Path f represents the degree to which this product term is predicted by children's risk and protective factors. The synergistic accumulation of self-fulfilling effects stemming from this moderation is modeled by Path g in Figure 1.³

METHOD

Participants

The data for this study were obtained from the Rural Family and Community Drug Abuse Prevention Project (Spoth, Redmond, & Shin, 1998; Spoth, Reyes, Redmond, & Shin, 1999), a longitudinal study focusing on the prevention of adolescent substance use and other problem behaviors. Analyses were based on data from families who resided in Iowa. The sample consisted of 115 seventh-grade children plus their mothers and fathers. Only 1 child in each family provided data. There were 60 girls and 55 boys, including 1 Latino-Hispanic American and 114 Caucasians. These families had all been assigned to

²Self-fulfilling prophecies may also accumulate across multiple perceivers in an additive fashion. In this form of accumulation, the total self-fulfilling effect of different perceivers on a given target's outcomes equals the sum of the perceivers' individual self-fulfilling effects, a process referred to as concurrent accumulation (Jussim et al., 1996, see pp. 368–370).

³Across all children, when Paths d and e are both significant and positive, one parent's belief is just as likely to cause the self-fulfilling effect of the other parent's belief to dissipate as to cause individual effects to accumulate (Jussim et al., 1996). The potential for synergistic accumulation exists when parents both overestimate or both underestimate their child's alcohol use.

participate in the minimal-contact control condition of the larger study on the basis of the school attended by the participating child.⁴

Procedure

A staff member administered questionnaires to family members at each family's residence. Family members completed their questionnaires individually with the knowledge that their responses were confidential and would not be communicated to other family members. For the current study, we used questionnaire data collected on two occasions 12 months apart.⁵

Questionnaires

Questionnaire data obtained at the first assessment measured parents' beliefs about their child's alcohol use, family income, and parental education, and the child variables of gender, perception of friends' alcohol use, perceived accessibility of alcohol, perceived rewards for alcohol use, perceived norms regarding adolescent alcohol use, perceptions of parents' global parenting (e.g., parents' affective quality, discipline, standard setting, and monitoring of the child's behavior), self-assessed likelihood of drinking alcohol in the coming year, and past alcohol use. Questionnaire data from the second assessment, which occurred 12 months later, measured children's recent alcohol use, which we refer to as children's future alcohol use. Table 1 presents the items assessing parents' beliefs and children's alcohol use, along with information on reliability and scoring procedures. Parallel information for the other variables is available upon request.

RESULTS

Preliminary Analyses

Nonindependence

Individual families were clustered within schools, raising the possibility of nonindependence among the individual-level observations. To evaluate the effects of clustering on the results, we analyzed the data using SAS PROC MIXED, which accounted for clustering by including school as a higher-level

⁴The larger study also included families participating in one of two interventions: Preparing for the Drug Free Years ($n = 109$) and Strengthening Families Program ($n = 111$; Spoth et al., 1998, 1999). Our analyses did not include these families because (a) parents' beliefs were not assessed until after the interventions were implemented, and (b) there were no self-fulfilling prophecy effects for either mothers or fathers among these families, so there was no potential for accumulation of self-fulfilling prophecy effects.

⁵The larger study also included an initial baseline assessment that occurred approximately 6 months prior to what is referred to in this article as the first assessment and approximately 18 months prior to what is referred to as the second assessment. Because the baseline assessment did not include a measure of parents' beliefs, it did not provide the necessary data to test for self-fulfilling prophecies and therefore is not discussed further. However, the reader should be aware that the two assessments in this article correspond to what were the second and third assessments in the larger study.

TABLE 1
Items Measuring Parents' Beliefs and Children's Alcohol Use

Question	Scale labels
Parent report	
Mothers' and fathers' beliefs about children's alcohol use ($\alpha_{\text{mothers}} = .66$, $\alpha_{\text{fathers}} = .56$)	
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?	1 (<i>very likely</i>), 5 (<i>very unlikely</i>)
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 walk away?	1 (<i>very likely</i>), 5 (<i>very unlikely</i>)
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?	1 (<i>certain this will not happen</i>), 10 (<i>certain that this will happen</i>)
Child report	
Past alcohol use ($\alpha = .75$)	
Since we last interviewed you, have you drunk beer, wine, wine coolers, whiskey, gin, or other liquor?	0 (<i>no</i>), 1 (<i>yes</i>)
Since we last interviewed you, have you drunk beer, wine, or liquor without a parent's permission?	0 (<i>no</i>), 1 (<i>yes</i>)
Since we last interviewed you, have you been drunk from drinking beer, wine, wine coolers, or liquor?	0 (<i>no</i>), 1 (<i>yes</i>)
During the past month, how many times have you had beer, wine, or other liquor?	open-ended
Future alcohol use ($\alpha = .73$)	
During the past month, how many times have you had beer, wine, wine coolers, or other liquor? (If none, write 0.)	open-ended
During the past month, how many times have you had three or more drinks (beer, wine, or other liquor) in a row? (If none, write 0.)	open-ended

Note. Mothers and fathers responded individually to the parent-report items. Children's responses to the open-ended items assessing past and future alcohol use were dichotomized by assigning a value of 0 to children who reported no episodes of drinking and a value of 1 to children who reported one or more episodes of drinking. For past alcohol use, coded responses were summed to create a score for past alcohol use that could range from 0 to 4. For future alcohol use, coded responses were summed to create a score for future alcohol use that could range from 0 to 2. For combining responses that were provided on different scales, items with fewer response options were recoded. For example, for the items assessing parents' beliefs, responses on the 5-point scale were recoded to a 10-point scale (i.e., 1 \rightarrow 1.0, 2 \rightarrow 3.25, 3 \rightarrow 5.5, 4 \rightarrow 7.5, 5 \rightarrow 10.0). The reliability of each parent-belief scale was calculated with Cronbach's alpha. The reliability for each alcohol-use scale was calculated with Kuder-Richardson 20.

random effect. Results indicated that school accounted for virtually none of the variance among the individual-level observations, and the coefficients, standard errors, and results of significance tests were the same as those yielded by traditional regression analyses that assumed independence of individual observations. Because clustering had no effect on the results, we used a traditional regression approach to analyze the data.

Multicollinearity

All variables were mean centered (Cohen & Cohen, 1983) to minimize multicollinearity.

Parents' Inaccuracy

Two separate analyses—one focusing on mothers' beliefs and another focusing on fathers' beliefs—regressed the centered raw-score parent-belief variable on children's risk and protective factors for alcohol use. The residuals yielded by these analyses represent the degree of inaccuracy associated with each parent's belief because they equal the degree to which a belief was greater or less than that which would have been expected on the basis of a child's risk and protective factors (see Fig. 1). A residual score above zero reflects a harmful belief because it overestimates the child's alcohol use in comparison with the

child's risk and protective factors. A residual score below zero reflects a helpful belief because it underestimates the child's alcohol use in comparison with the child's risk and protective factors. Residual scores close to zero correspond to relatively accurate beliefs.

Main Analyses

Effect sizes for the main findings are presented in terms of f^2 , which is the measure of effect recommended by Cohen (1977) for multiple regression analyses. Table 2 presents descriptive statistics and correlations for the individual-level variables.

Step 1: Base Model

Step 1 of the regression analysis predicted children's future alcohol use from a base model that included the risk and protective factors for adolescent alcohol use described earlier. These variables collectively accounted for 49% of the variance in children's future alcohol use, $F(10, 104) = 9.78$, $p < .001$ (Table 3). In addition, three variables explained significant amounts of unique variance in children's future alcohol use. Children's past alcohol use, $\beta = .49$, $t = 5.39$, $p < .001$, and their perceptions of their friends' alcohol use, $\beta = .29$, $t = 3.13$, $p = .002$, were both significantly and positively related to the

TABLE 2
Descriptive Statistics and Correlations for the Demographic and Alcohol-Relevant Variables (N = 115)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Family income	—	.26**	-.12	.20*	.20*	-.03	-.08	.17	.20*	.04	.12	.11	.11
2. Parental education		—	-.01	-.07	.16	-.13	-.05	.20*	-.07	-.05	-.19*	.14	-.06
3. Child gender ^a			—	-.13	-.08	.09	-.03	-.01	-.04	-.03	-.16	-.10	.12
4. Perception of friends' alcohol use				—	.30**	.17	-.28**	-.11	.41**	.57**	.40**	.16	.53**
5. Perceived accessibility of alcohol					—	-.02	-.07	-.01	-.35**	.30**	.20*	.22*	.16
6. Perceived rewards for drinking alcohol						—	-.18	.03	-.01	.13	.03	.11	.04
7. Perceived norms for alcohol use							—	.05	-.42**	-.27**	-.14	-.12	-.17
8. Perception of global parenting								—	-.20*	-.20*	-.18	-.09	-.13
9. Self-assessed likelihood to drink									—	-.36**	-.40**	-.19*	.33**
10. Past alcohol use										—	.26**	.19*	.62**
11. Mothers' beliefs ^b											—	.24**	.37**
12. Fathers' beliefs ^b												—	.18
13. Children's future alcohol use													—
<i>M</i>	42,613 ^c	13.60 ^d	52% ^e	1.17	1.94	1.83	3.86	5.54	1.23	0.36	2.39	2.74	0.15
<i>SD</i>	22,454	1.73	—	0.46	1.20	1.01	0.42	0.78	0.52	0.82	1.67	1.51	0.46

^aBoys were coded as 1 and girls as 2. ^bCorrelation results for raw scores are provided in lieu of those for residuals because the latter were generated by regressing the raw scores on all other predictor variables, thereby yielding correlations equal to 0. The correlation between mothers' and fathers' belief residuals was $r = .19, p = .04$. The correlation between mothers' belief residuals and the outcome variable of children's future alcohol use was $r = .17, p = .08$. The correlation between fathers' belief residuals and the outcome variable of children's future alcohol use was $r = .08, p = .41$. ^cMeasured in dollars. ^dYears of education. ^ePercentage of children who were girls.
* $p < .05$. ** $p < .01$.

outcome variable. Child gender also significantly predicted children's future alcohol use. Across the time frame of the study, girls exhibited greater increases in alcohol use than boys, $\beta = .18, t = 2.52, p = .013$. Because past alcohol use was included in the base model, significant results indicate the ability of a variable to predict changes in alcohol use over time controlling for all other variables in the model. All subsequent steps

in the analysis added variables to those included in the base model.

Step 2: Self-Fulfilling Prophecies

Step 2 tested for the occurrence of self-fulfilling prophecies by adding mothers' and fathers' belief residuals to the base model. This step determined whether the inaccurate portion of parents'

TABLE 3
Summary of the Hierarchical Analysis for Prediction of Children's Future Alcohol Use (N = 115)

Variable	β	<i>SE</i>	<i>b</i>	<i>p</i>
Step 1: Base model ($R^2 = .49$)				
Family income	.06	.02	.01	.472
Parental education	-.01	.02	-.03	.899
Child gender	.18	.07	.17	.013
Perception of friends' alcohol use	.29	.09	.29	.002
Perceived accessibility of alcohol	-.10	.03	-.04	.214
Perceived rewards for drinking alcohol	-.08	.03	-.04	.287
Perceived norms for alcohol use	.07	.09	.08	.381
Perception of global parenting	.01	.05	.05	.908
Self-assessed likelihood to drink	.09	.08	.08	.298
Past alcohol use	.49	.05	.27	<.001
Step 2: Self-fulfilling prophecies ($\Delta R^2 = .03$)				
Mothers' belief residuals	.16	.03	.07	.028
Fathers' belief residuals	.05	.02	.02	.491
Step 3: Synergistic accumulation effects ($\Delta R^2 = .02$)				
Mothers' Belief Residuals \times Fathers' Belief Residuals	.15	.01	.03	.03

Note. Mothers' and fathers' belief residuals were created by regressing centered raw scores for mothers' and fathers' beliefs on all variables in Step 1 of the analysis and saving the residuals. The product term was created by (a) multiplying the mothers' belief centered raw score by the fathers' belief centered raw score, (b) regressing this product on all variables included in Step 1 plus the mothers' and fathers' belief centered raw scores, and (c) saving the residuals. The dependent variable in this analysis was children's future alcohol use. The residual degrees of freedom were 104 for Step 1, 103 for Step 2, and 102 for Step 3.

beliefs uniquely predicted changes in children's future alcohol use beyond those predicted by the base model. Mothers' belief residuals significantly predicted unique variance in children's future alcohol use, $\beta = .16$, $t = 2.22$, $p = .028$, $f^2 = .049$, whereas fathers' belief residuals did not, $\beta = .05$, $t = 0.69$, $p = .49$, $f^2 = .004$ (Table 3). These findings remained stable regardless of whether mothers' and fathers' belief residuals were added individually or simultaneously to the model. Because the residual terms represent the inaccurate portion of parents' beliefs, the significant and positive coefficient for mothers' belief residuals indicates that mothers' beliefs that overestimated children's future alcohol use predicted greater increases in future alcohol use than were predicted by the base model. Likewise, mothers' beliefs that underestimated children's future alcohol use predicted smaller increases in future alcohol use than were predicted by the base model. These results are consistent with the interpretation that mothers' beliefs had a self-fulfilling effect on children's future alcohol use, but fathers' beliefs did not.

Step 3: Synergistic Accumulation

In Step 3, the residualized product of mothers' and fathers' beliefs was added to the model to test whether the individual self-fulfilling effects of mothers' and fathers' beliefs accumulated synergistically. This product term was created by (a) multiplying the mothers' belief centered raw score by the fathers' belief centered raw score, (b) regressing this product on all variables included in Step 1 plus the mothers' and fathers' belief centered raw scores, and (c) saving the residuals. The inclusion of this product term tested whether the strength of the relationship between parents' belief residuals and children's future alcohol use varied depending on the similarity of mothers' and fathers' belief residuals. Results indicated that the product term significantly predicted children's future alcohol use, $\beta = .15$, $t = 2.20$, $p = .03$, $f^2 = .047$ (Table 3). In terms of standardized regression coefficients, the effects of mothers' belief residuals were .05 and .26 when fathers' belief residuals under- and overestimated children's alcohol use by 1 *SD*, respectively. Correspondingly, the effects of fathers' belief residuals were $-.06$ and .15 when mothers' belief residuals under- and overestimated children's alcohol use by 1 *SD*, respectively.

To examine whether the form of this interaction supported synergistic accumulation effects, we calculated children's predicted alcohol use when (a) both parents' belief residuals were overestimates, (b) both parents' belief residuals were underestimates, (c) mothers' belief residuals were overestimates and fathers' belief residuals were underestimates, and (d) mothers' belief residuals were underestimates and fathers' belief residuals were overestimates. Parents' over- and underestimates were represented by parents' belief residuals 1 *SD* above and below the mean, respectively. The form of the interaction was consistent with synergistic accumulation

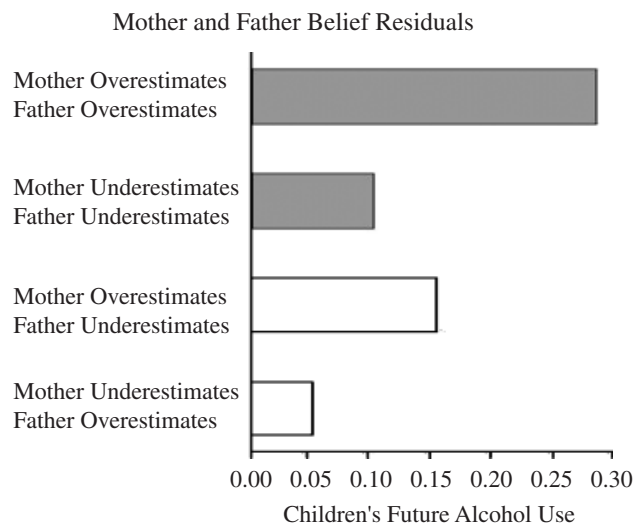


Fig. 2. Children's predicted future alcohol use (in terms of raw-score units) when both mothers' and fathers' belief residuals were overestimates, both mothers' and fathers' belief residuals were underestimates, mothers' belief residuals were overestimates and fathers' belief residuals were underestimates, and mothers' belief residuals were underestimates and fathers' belief residuals were overestimates. Parents' over- and underestimates were represented by parents' belief residuals that were 1 *SD* above and below the mean, respectively. The gray bars represent combinations with the potential for synergistic accumulation (i.e., both parents overestimated or both parents underestimated their child's alcohol use).

effects for parents' beliefs that overestimated children's alcohol use (Fig. 2). Mothers' beliefs that overestimated children's alcohol use more strongly predicted children's future alcohol use when fathers' beliefs also overestimated children's alcohol use. Similarly, fathers' beliefs that overestimated children's alcohol use more strongly predicted children's future alcohol use when mothers' beliefs also overestimated children's alcohol use. In contrast, results were not consistent with synergistic accumulation effects for parents' beliefs that underestimated children's alcohol use. Children's predicted future alcohol use was not substantially lower when both parents' beliefs underestimated children's alcohol use than when only one parent's belief did.

DISCUSSION

Psychological theory proposes that self-fulfilling prophecies can accumulate across multiple perceivers (Jussim et al., 1996; Klein & Snyder, 2003; Snyder, 1984). The present study is the first empirical test of this process. Data acquired from parents and their children were consistent with synergistic accumulation effects for negative beliefs: Parents' beliefs predicted the greatest degree of confirmatory behavior from children when both mothers and fathers overestimated how much alcohol their children would drink. Synergistic accumulation effects were not found for positive beliefs: Predicted increases in children's future drinking behavior were similar regardless of whether one

parent or both underestimated their child's use of alcohol. Before discussing the theoretical importance of these findings we consider general issues involved in the interpretation of findings from naturalistic data and the relevance of those issues to this study.

Interpretation of Naturalistic Data

Correlational designs do not provide as strong a basis for causal inference as do experiments. Although longitudinal designs—such as the one used here—do rule out the possibility that the outcome caused changes in the predictors, they do not rule out the possibility that a third, unmeasured variable was responsible for changes in both the predictors and the outcome. The potential omission of a valid predictor characterizes all naturalistic studies. Thus, it is possible that parents based their beliefs on valid predictors of adolescent alcohol use that were not controlled for statistically. If this happened, then parents were more accurate than estimated, and the self-fulfilling effects of their beliefs were smaller than reported. The omitted-variable explanation corresponds to the argument that perceiver accuracy caused the effects attributed to self-fulfilling prophecies.

For several reasons, however, we believe that the self-fulfilling prophecy interpretation of the findings is more compelling. First, such an interpretation is consistent with the long history of experimental findings demonstrating that perceivers' false beliefs influence targets' behaviors (Rosenthal & Rubin, 1978; Snyder, 1984, 1992; Snyder & Stukas, 1999). Of course, the fact that experiments find self-fulfilling prophecies does not prove that our results reflect self-fulfilling prophecies. Nonetheless, confidence in the validity of a general conclusion increases when naturalistic and experimental studies yield converging evidence.

Second, we controlled for a large number of theoretically and empirically supported predictors that incorporated a broad range of constructs relevant to adolescent alcohol use. This reduced the likelihood that an unmeasured third variable produced the relations between parents' beliefs and children's future alcohol use. Indeed, the risk and protective factors collectively accounted for 49% of the variance in children's future alcohol use, which is more variance than is typically explained when predicting similar outcomes (Madon, Guyll, Spoth, Cross, & Hilbert, 2003; Reid, 1991; Spoth, 1997).

Third, if the observed pattern of synergistic accumulation effects were due to the accuracy of parents' beliefs rather than to their self-fulfilling influence, then parents' beliefs would have been most accurate when both mothers and fathers overestimated their children's alcohol use. To investigate whether this was true in the current sample, we constructed a 2×2 table in which we crossed mothers' and fathers' beliefs that underestimated (residuals below zero) and overestimated (residuals above zero) children's alcohol use. For each cell in the table, we (a) calculated the average belief residuals for mothers and fathers, (b) took the

absolute values of these averages, and (c) averaged these values. This resulted in one value per cell, with each value representing the average degree of inaccuracy in parents' beliefs. Had parents' beliefs been most accurate when mothers' and fathers' beliefs were both overestimates, the value corresponding to the mother overestimate–father overestimate combination would have been lower than the values corresponding to the other three combinations.

However, a comparison of the values revealed the opposite pattern. Parents' belief residuals were greatest when both parents' beliefs were overestimates, $M = 2.59$ ($M = 2.03$ for the mother underestimate–father overestimate combination, $M = 1.82$ for the mother overestimate–father underestimate combination, and $M = 1.81$ for the mother underestimate–father underestimate combination). This pattern suggests that mothers and fathers who both overestimated their child's alcohol use were actually less likely than other parents to base their beliefs on their child's risk and protective factors. It further suggests that had valid predictors been omitted from the model, these parents would probably have also been less likely than other parents to have based their beliefs on these omitted variables. These data contradict the idea that the findings resulted from greater accuracy of parents when both mothers and fathers overestimated their child's alcohol use. For the reasons we have just outlined, we believe that the occurrence of a self-fulfilling prophecy is the more tenable interpretation of the data, and next discuss the theoretical importance of our findings.

Theoretical Importance

A prevailing theme in the social psychological literature is the belief that self-fulfilling prophecies contribute to social problems. However, naturalistic studies conducted during the past two decades have challenged this claim. Because perceivers' accuracy is high across a variety of naturalistic contexts, perceivers' self-fulfilling effects are quite small in magnitude (Jussim, 1989; Jussim & Eccles, 1992; Madon et al., 2003). Moreover, self-fulfilling prophecies tend to be more helpful than harmful (Madon et al., 2003; Madon, Jussim, & Eccles, 1997). Consistent with these patterns, the self-fulfilling effects observed in this study were also generally small and tended to buffer children against increased alcohol use rather than put them at greater risk—that is, a parent's underestimation of a child's alcohol use predicted relatively low levels of future alcohol use regardless of whether the other parent's belief under- or overestimated the child's alcohol use. Given these patterns, one might infer that self-fulfilling prophecies contribute less to social problems than has traditionally been thought.

However, the current study also found that only parent beliefs that overestimated children's alcohol use accumulated synergistically. This finding raises the possibility that the self-fulfilling effects observed in the literature, which have focused exclusively on dyadic relations, may underestimate the true extent to which individual targets are influenced by others'

negative beliefs, because these studies have not taken into consideration the possibility that negative self-fulfilling prophecies accumulate more than do positive ones. This possibility is particularly relevant to members of stereotyped groups that are disproportionately exposed to negative beliefs. Social stereotypes are the shared beliefs of multiple perceivers about targets belonging to particular social groups (Ashmore & Del Boca, 1981). Because such beliefs are often unfavorable, targets belonging to stereotyped groups may typically encounter perceivers who hold unfavorable beliefs about them. Accordingly, members of stereotyped groups may be disadvantaged by virtue of existing in a field of negative beliefs.

Of course, in this research, one perceiver's positive belief tempered the harmful effects of another's negative belief, suggesting that members of stereotyped groups may be shielded from confirming negative stereotypes if they are also exposed to positive beliefs. However, the demonstrated effect occurred in the context of a single positive and a single negative belief for any given target, which contrasts with the situation faced by members of many stereotyped groups, who may typically be confronted with substantially more negative than positive beliefs. The potential for positive beliefs to temper the harmful effects of negative beliefs may not materialize as the ratio of negative to positive beliefs increases.

In sum, this research provides evidence that self-fulfilling prophecy effects can accumulate across multiple perceivers, and that negative beliefs are more likely than positive beliefs to yield this effect. Although the self-fulfilling prophecy effects observed in this research were relatively small in magnitude, it is conceivable that such effects could become more powerful as the number of perceivers holding similar negative and inaccurate beliefs about a given target increases.

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