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The Association Between Observed Parental Emotion Socialization and Adolescent Self-Medication

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Abstract

The current study examined the moderating influence of observed parental emotion socialization (PES) on self-medication in adolescents. Strengths of the study include the use of a newly developed observational coding system further extending the study of PES to adolescence, the use of an experience sampling method to assess the daily covariation between negative affect and substance use, and a focus on PES styles defined by the interaction of emotion-dismissing and emotion–coaching behaviors. Using multi-leveling modeling, we tested PES as a moderator of daily negative mood-substance use relation in a sample of 65 elevated-risk adolescents (48% male, 58% Caucasian, with a median age of 14). Results showed a three-way interaction between emotion-coaching PES, emotion-dismissing PES and daily negative mood in predicting daily substance use. Results are discussed in terms of the importance of PES styles and their effects on self-medication through compromised emotion regulation and interpersonal processes.

Keywords

adolescence; self-medication; parental emotion socialization; parenting styles; multilevel modeling

Although previous studies indicate that families contribute significantly to adolescents' substance use (e.g., see Chassin et al., 2004 and Feldstein & Miller, 2006 for reviews; Jacob & Johnson, 1997), family-based research has yet to examine particular patterns of substance use, such as self-medication. Self-medication confers significant risk for the development of future substance-related problems (e.g., Cooper, 1994) and self-regulatory mechanisms due to over-reliance on drinking as an avoidant coping strategy (Cooper, Russell, Skinner, Frone, & Mudar, 1992). The present paper focuses on one important aspect of family-based interaction, parental emotion socialization, that we argue plays a key role in adolescents' self-medication.

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Self-Medication

The self-medication hypothesis posits that substances are used to regulate negative affect (Conger, 1956). Implicit in this definition is the assumption that the use of substances temporally follows the experience of increased negative affect within a short-term process (e.g., within a day or across several days). The majority of research on self-medication in adolescence relies on retrospective self-reports of negative affect and substance use that are typically linked over the course of months or even years. In general, these studies show consistent but weak evidence for the relation between negative affect and subsequent use (e.g., Hussong & Chassin, 1994; Wills & Filer, 1996). However, a more optimal design is the daily assessment of affect and use, testing the close temporal link inherent in the self-medication model. Using this approach, we found evidence of self-medication among adolescents with more emotion regulation difficulties (Feagans Gould, Hussong, & Hersh, 2007) and among those with fewer conduct problems (Hussong, Feagans Gould, & Hersh, 2008). In this study, we extend this research to test whether adolescents whose parents respond to their children's stress in constructive ways will be less likely to self-medicate whereas adolescents whose parents respond in dismissive ways will be more apt to engage in self-medication.

Parental Emotion Socialization (PES)

Children primarily learn about emotion through the family environment (Halberstadt, 1991). PES, or parents' general influence on children's learning how, when, and where to experience, express, and regulate emotion (e.g., Eisenberg, Cumberland, & Spinrad, 1998) can occur through both indirect (e.g., emotional atmosphere of the family, modeling) and direct (e.g., parents' proximal reactions to children's expression of negative affect) models (Morris, Silk, Steinberg, Myers & Robinson, 2007). Parental meta-emotion philosophy (Gottman, Katz, & Hooven, 1997) is a useful organizing framework for thinking about emotions in the family, conceptualizing parents' awareness of their own and their children's emotions, and delineating how parents develop rules and regulatory strategies around emotion. *Emotion-coaching* families embrace their children's negative emotions, validate these emotions, empathize with their children's negative emotions, and use emotionally-charged events as a source of interpersonal intimacy (Gottman et al., 1997). *Emotion-dismissing* families ignore and deny children's negative affective experiences, view negative affect as a nuisance, and trivialize children's negative emotions. Although families may certainly exist along a continuum with respect to how they both conceptualize and behave regarding their children's negative affectivity, Gottman and colleagues have provided a clear framework that facilitates our understanding of emotion in the family from both normative and developmental psychopathology perspectives.

In general, parents' emotion-coaching behaviors predict multiple child outcomes ranging from better physical health to less negative affectivity in the peer context (e.g., Gottman et al., 1997; Katz & Windecker-Nelson, 2004). Supportive parental reactions to children's negative emotions are associated with children's social skills and their ability to cope with their own negative emotion (Eisenberg, Fabes, & Murphy, 1996; Miller, Kliewer, Hepworth, & Sandler, 1994) whereas non-supportive parental reactions are associated with children's

greater social and emotional difficulties (see Eisenberg et al., 1998 for review). Taken together, these studies suggest that how parents react to children's distress may indeed affect children's socioemotional functioning and the development of important coping capacities.

Although we know increasingly more about PES of school-aged children, research on adolescents is lacking. Nonetheless, available studies show a fairly consistent pattern whereby less parental emotion-coaching and more emotion-dismissing behavior predict greater internalizing and externalizing difficulties in adolescents (e.g., Garside & Klimes-Dougan, 2002; Katz & Hunter, 2007; Sheeber, Davis, Hops, & Leve, 2003). In particular, Katz and Hunter (2007) have demonstrated that adolescents whose mothers were more accepting of their own emotions and more coaching of their adolescents' emotions had higher levels of self-esteem and lower levels of internalizing and externalizing behavior, less physiological arousal, and a lower likelihood of reciprocating parents' sadness with their own aversive behavior. Sheeber et al. (2003) and Shortt, Smith, and Stoolmiller (2006) have shown that maternal emotion-coaching is related to less depressive symptomatology and externalizing behavior through fewer emotion regulation difficulties, thus highlighting a purported mechanism involved in the effects of PES on adolescent outcomes. However, no study to date has explored the relations between PES and substance use, specifically.

Calkins and Bell (1998) argue that adolescence is a unique and important developmental period in which to examine the impact of PES due to increased emotional instability and negative affect (Kandel & Davies, 1982, Zahn-Waxler, Klimes-Dougan, & Kendziora, 1998) and increased parental and familial negativity (Conger & Ge, 1999; Montemayor, Eberly, & Flannery, 1993). Moreover, those familial contexts marked by changes in family roles, increases in adolescents' need for autonomy, and salient school transitions are likely to best capture the role of PES in adolescents' emotional functioning (Calkins & Bell, 1998). The present paper addresses PES during such a time, namely amid the transition to high school and its concomitant academic, psychological, and interpersonal changes (Barber & Olson, 2004; Seidman, Aber, Allen, & French, 1996).

Although the study of PES to date has involved main effects models that posit relations among different PES elements (i.e., coaching, dismissing) and relevant child outcomes, there is reason to believe that, like different aspects of parenting that interact with one another, different forms of PES may indeed interact to create PES *styles* that may better predict certain outcomes. The idea of parenting styles is not new and emerged in seminal work by Baumrind (1991) and in more recent empirical studies of the interactive effects of multiple aspects of parenting (e.g., Caron, Weiss, Harris, & Catron, 2006). In the current paper, we extend the well-supported notion of parenting styles to the realm of PES by examining the interactive effects of emotion-dismissing and emotion-coaching PES practices on adolescent self-medication.

PES and Self-Medication

Although some of the research demonstrating links between PES and adolescent outcomes incorporates emotion-based mechanisms of action (e.g., Shortt et al., 2006), no study to date has tested the moderating effects of PES on a short-term temporally-sequenced emotion

regulatory *process* such as self-medication. Social learning theory can help frame such a proposed relationship. By modeling maladaptive reactions to their adolescents' stress, parents may teach their children less adaptive stress responses. Moreover, the manner in which parents respond to adolescents' stress, such as blaming the adolescent for their own distress, may impact emotional competence, as adolescents come to view their emotions in adversarial ways and struggle to appropriately identify, express, and regulate their emotions. Finally, through parent-adolescent interpersonal interactions, parents' dismissive stance toward adolescents' emotions, for example, may signal a relative lack of parental support and future availability to discuss adolescents' emotional life. Consequently, this process may exacerbate risk for alternative, more maladaptive coping strategies such as the use of substances in response to heightened negative affect.

Previous studies show that parents' emotional and instrumental support can function to reduce the likelihood of substance use through adaptive coping and less anger (Wills, Mariani, & Filer, 1996) and to buffer the consequences of adolescents' experience of distress (Wills, Blechman, & McNamara, 1996). Although these studies do not demonstrate parents' influence on the self-medication process specifically, they do highlight a functional model of parents' emotional responsiveness (Wills, Mariani et al., 1996) in relation to both negative affect and substance use among adolescents. The current paper specifically attends to the regulation of negative mood through substance use as an *on-line* self-regulatory mechanism that we argue is influenced by how adolescents are socialized to manage their negative affect.

The Current Study

The current paper examines the link between self-medication and PES. In so doing, we contribute to the extant literature by matching the theoretical notion of self-medication as a short-term temporal process with a complimentary methodology (i.e., daily experience sampling). We also advance the literature on PES by using a newly adapted observational method (Hersh, 2006). Although parental self-reports of PES have yielded valuable information, observational methods afford researchers a more subtle and nuanced look at how parents spontaneously react to their adolescents' experience of stress and negative emotion (Fivush, 1998), particularly during times of heightened adolescent negative affectivity (Katz, Wilson, & Gottman, 1999). As our investigation of PES *styles* reflects a more person-centered perspective, we provide a unique perspective on the link between PES and self-medication. Specifically, we hypothesize (a) a two-way interaction between emotion-coaching (EC)/emotion-dismissing (ED) parental responses to adolescents' stress and adolescents' daily negative mood such that EC responses will buffer the self-medication process whereas ED responses would serve to exacerbate this tendency and that (b) PES *styles* may place adolescents at greater or less risk for self-medication. Our examination of the PES styles hypothesis is purposely exploratory given the lack of existing work on this topic. Thus, we examined the possibility that ED parental behaviors might exert their exacerbating impact on adolescents' negative mood-linked substance use only when EC behaviors are relatively low, for example. Alternatively, a PES style may emerge that confers risk for adolescent self-medication through a combination of high levels of both EC and ED parental behaviors.

Methods

Overview

Participants for the current study were part of the High School Transition Study (HSTS), a longitudinal study of the transition from 8th to 9th grade (see Hussong et al., 2008). The HSTS followed a two-stage research design that began with a school-based survey of eighth graders in a single school district in rural North Carolina. In this first stage, 399 of 436 8th grade students in participating schools completed classroom administered surveys which assessed a broad range of factors, including risk indicators for substance use (i.e., initiation of self and peer alcohol use). In the second stage, a subset of participants were recruited from this larger sample according to their rank-order of risk status (i.e., from high to low) related to substance use. Stage two participants (including target adolescents, parents, and target-selected peers) completed a multi-component battery over a three-week period.

Participants

Participants for the current analyses were drawn from stage two. These participants were recruited from the 399 participants in stage one during the summer between 8th and 9th grade (and thus recruitment was limited to an eight-week period). We attempted to contact 196 stage one participants, and 81 consented to participate. The primary reasons for non-participation included the following: inability to contact (n = 33); ineligibility due to language barrier, moving, did not pass grade (n=21); limited availability (n = 17); and privacy concerns (n = 11). Of 142 total eligible, contacted families, 57% participated in stage two (n = 81).

Stage two participants were included in the current analyses if they had complete data on the parent-adolescent observation task (n=4 excluded for non-participation and n=9 excluded for poor video quality) and the experience sampling task (an additional n=2 excluded). One additional adolescent was omitted for sporadic completion of survey-based measures, resulting in the current sub-sample of N=65. On average, adolescents in this sub-sample were 13.9 years of age, approximately half (52%) were girls, and the majority (59%) were White. The balance of racial/ethnic backgrounds included 14% African-American, 23% multi-racial, and between 1.5–3% identifying respectively as Latino/Hispanic, Asian American/ Pacific Islander, American Indian or “other”. Most participating parents were mothers (94%) who were on average 43 years of age. Parents were generally highly educated with more than half having earned a college (19%) or an advanced (38%) degree. The majority of parents were Caucasian (65%), with the remainder self-identifying as African-American (25%), multi-racial (5%), or Latino/Hispanic, Asian American/Pacific Islander or Native American (between 1.5–3% each).

A series of t-tests and chi-square tests examined the representativeness of the elevated risk sample of interest (N=65) relative to the larger school-based Stage 1 sample (N=399) from which the current study was drawn. As expected, adolescents in the current risk sample had higher levels of depression (t [352] = −2.70, p<.01), aggression (t [351] = −2.70, p<.01), anger (t [353] = −2.72, p<.01), stress (t [353] = −1.84, p=.06), and substance use (t [351] = −2.38, p<.05). When comparing the current sample to the full Stage 2 sample (N=81),

participants dropped from analyses only differed on reports of lower substance use (t [78] = −2.28, p=.03) and parent educational attainment (t [78] = −2.42, p=.02) and were marginally more likely to be ethnic minority or multiracial adolescents (χ^2 = 3.82, p=.06). On balance, the present sample showed appropriately elevated risk on numerous psychological markers and was deemed representative of the Stage 2 sample.

Procedures

In the first stage of the study, seven of nine schools housing 8th graders in a rural, school district agreed to participate in the study. Parents were informed about the study through letters mailed to their homes as well as sent home directly with students and were asked to contact the PI if they did not want their children invited to participate in the study (3% did so). Information about the study was made available for parents to review in each school. Pairs of research assistants conducted classroom based assessments of 8th graders in which they explained the study to students, obtained informed consent, and administered surveys. Teachers were invited to stay during testing but were asked not to interact with students to protect confidentiality. Students received a token gift, and schools received a financial gift for participating in the study. One make-up day per school was also held to assess students absent on the original testing day.

In stage two, we contacted families by phone and mail in order of risk for substance use during the study period based on pre-established risk criteria. We determined level of risk for substance use using a six-point scale comprised of self-reported lifetime and current alcohol use as well as peer drinking (e.g., endorsement of all three indicators was the highest risk category). We formed a recruitment list by rank ordering all stage one participants on this risk indicator (i.e., from high to low), ranking at random those sharing equivalent scores. We recruited participants in rank order from this list until the end of our recruitment period. We attempted to contact the first 196 participants on the recruitment list (including all 169 participants who listed any level of risk on the 6-point index as well as 27 participants who indicated no risk on this index), with 81 completing the study (i.e., 41% of those targeted for recruitment, n = 196, or 57% of those eligible and contacted for recruitment, n = 142).

Participants completed a three-week protocol, during which pairs of research assistants conducted two home visits or met with the participants at the university. During this initial visit, research assistants met with the target adolescents and their parents, obtained written assent and consent, respectively, and interviewed them in separate rooms, using a white noise machine to protect privacy, conducted observational assessments of parent-adolescent interactions, and explained the procedures behind the experience sampling task.

Adolescents privately entered their responses to a computer-administered interview during which a research assistant read the questions aloud to them. Sensitive questions pertaining to substance use were administered via a computer assisted interview. Research assistants also read questions aloud to parents who completed the assessment using a paper-and-pencil method. We then asked adolescents and parents to engage in three video-taped interaction tasks. To ensure privacy, interviewers used white noise machines and guarded participants from other family disruptions during testing.

To explain the next phase of data collection (i.e., experience sampling methodology), we gave adolescents a watch with pre-set alarms to remind them over the subsequent 3-week period to record thrice daily their mood and once daily their substance use. Affixed to the back of the watch by velcro was a 1" x 1" pouch containing a (mood rating) booklet of accordion-style folded brief surveys on which adolescents placed stickers on numbers corresponding to the extent to which they felt particular moods at that moment. Three alarms signaled mood recordings at randomly selected times between 10AM–2PM, 2PM–6PM, and 6PM–10PM to capture varying mood over the day. The fourth alarm was set at 10PM to remind participants to complete daily substance use ratings, although if adolescents were unable to privately record their use at this time or they were still using after 10PM they were instructed to wait until they were about to go to bed to make their ratings. If participants forgot to make this recording at night, we instructed them to make the rating the next morning. To help ensure confidentiality, adolescents recorded their past 24-hour substance use on booklets that adolescents were then instructed to place in HSTS-provided secure boxes stored in a safe place in their room (that project staff, but not parents, knew about). Adolescents were also encouraged to call the research project toll-free to confidentially report their data for the day, as a back-up system for lost data. Research assistants called participants repeatedly over the following three weeks to remind them to complete their ratings and to answer questions about the procedure. The rating slips that adolescents completed each day were collected at the end of the 3-week experience sampling period during a final interview. Adolescents and their parents each received $15 for completing this initial interview, and adolescents received $1 per day of recordings and were also entered in a lottery for three $30 prizes for each time they called in their data.

Measures

Demographic variables—In stage one, adolescents reported their ethnicity and gender. In stage two, parents reported each parent's educational status, with the higher of the two forming the parental educational attainment variable. Table 1 displays the correlations among these and other study variables.

Daily negative mood and substance use—In stage 2, participants completed three mood ratings at randomly sampled times throughout each of 21 days. Using a five-point scale, they rated their mood in the moment (with items based on the MAACL-R, Lubin, Denman & Van Whitlock, 1998). To approximate temporal precedence of mood over substance use ratings, we defined daily negative mood prior to evenings, when most use occurs, by averaging ratings of worry, stress, sadness and (reverse-scored) cheerfulness within report and taking the maximum score over the first two reports of each of 21 days. The resulting daily reports of mood were adequately reliable (average $\alpha = .75$).

Substance use ratings occurred each evening before bed and assessed the past 24 hours of use. Ratings were obscured to protect privacy. On a slip of paper for each day, participants placed stickers over a number (0 to 5+) to indicate the number of alcoholic drinks they had that day and additional stickers over the letter M if they had used marijuana or D if they had used other drugs. Due to expected low rates of endorsement, each daily substance use rating was coded as "0", reflecting no use, or "1", reflecting any use of any substance.

For quality assurance, we compared data collected from the recording device with that phoned in by our adolescents and developed a quality rating system for our confidence in each datum. Ratings ranged from “very confident” where the two forms of reported data were available and overlapped (45%) to “skeptical” where only booklet ratings were available and stickers were placed in between response options (less than 1%). For the current analyses, we only used data in which we were “confident” (99%), that is in which a participant clearly reported their mood or substance use in at least one form. Number of days of missing data ranged from 0–19; however, 82% of the sample reported over 14 days of complete data. This resulted in a total of 1116 person-days (an average of 17 days per person) of observed data for the 65 participants.

The base rate of any substance use across the three week sampling period involved a total of 60 observations from 16 adolescents (25% of sample). As expected for such an elevated risk sample, this rate is higher than past 30-day retrospective reports of any illicit substance use (10.9%) and alcohol use (17.2%) by 8th graders as assessed in the Monitoring the Future study (Johnston, O'Malley, Bachman, & Schulenberg, 2007). Of these 60 observations, the most frequently used substance was alcohol alone (47.5% of total instances of use), followed by marijuana alone (40.7%). Use of other illicit drugs only constituted 3.4% of the total instances of substance use, and other combinations of poly-substance use (e.g., marijuana and alcohol) comprised the balance (8.4%).

Parental emotion socialization (PES)—We used an observational coding system for PES to evaluate a personal disclosure task between adolescent-parent dyads. Following a one minute warm-up task in which dyads planned a family vacation, adolescents disclosed a personal stressor to their parent and the dyad discussed this issue for five minutes. Adolescents identified their stress topics just prior to the interaction and adolescents who had difficulty identifying a topic were asked to discuss the upcoming transition to high school. Research assistants made every effort to prevent discussion of a topic of mutual concern or conflict between adolescents and parents. Stressor topics included peer relations problems, academic difficulties, time management constraints, and general high school transition stress.

The PES coding system, adapted from Brand, Mulvihill, and Zahn-Waxler (2002), was designed to capture parents’ responses to adolescents’ expression of stress and negative affect. The original coding scheme was expanded to include parental responses that would be particularly relevant for adolescents, to apply to parental responses to adolescents’ more global expressions of stress (rather than discrete negative emotions as in Brand et al.), to rate parental behaviors on a continuous vs. dichotomous scaling, and to capture not only specific parental verbal content, but also tone, rhythm, and intensity of speech (following the Autonomy-Relatedness coding system used in Allen, Hauser, Eickholt, Bell, & O’Conner, 1994). The seven subscales included parents’ responses that were *emotion-focused* (i.e., empathy and validation of affect), *problem-focused* (i.e., targeting the stressor itself with questions and advice), *minimizing* (i.e., dismissing the affect as unimportant), *punitive* (i.e., blaming the adolescent for the affect); *magnifying* (i.e., intensifying adolescents’ affect), and *autonomy-inhibiting* (i.e., interfering with adolescents’ independence in dealing with their affect). In addition, the *facilitative engagement* response involved parents’ general

sensitivity and responsiveness to adolescents' bids to discuss their affect. Using a meso-analytic approach, global Likert scale ratings were given for each type of parental reaction for each minute of the 5-minute interaction. A 4-point scale represented an (1) absence, (2) minimal, (3) moderate, or (4) strong presence of the behavior reflected in each code. To capture greater variability in a more global code, a 5-point scale for *Facilitative Engagement* represented an (1) absence, (2) minimal, (3) moderate, (4) strong, or (5) very strong presence. Coder training occurred in two phases prior to the formal coding phase, totaling 45 hours of both group-based consensus building and calibration for initial reliability (ICC cut-off of .65; see Mahoney, Coffield, Lewis, & Lashley, 2001 for support). One third of tapes were subject to reliability checks, and additional training occurred if reliability fell below ICC=.65.

Hersh and Hussong (2006) demonstrated promising convergent and discriminant validity, with problem-focused, facilitative engagement, emotion-focused, autonomy-inhibiting, and minimizing codes variably being associated in the expected directions with adolescent and parent reports of adolescent-parent communication (Barnes & Olson, 1982) and parental autonomy-granting (Steinberg et al., 1991) (absolute value *r*s = .20 – .32) but not family conflict (Bloom, 1985). Preliminary concurrent validity was demonstrated in associations between problem-focused, facilitative engagement, and magnify codes and adolescent self-reports of depressive symptoms (SMFQ; Angold et al., 1995), avoidant coping, and developing social support coping (Patterson & McCubbin, 1987). Punitiveness and autonomy-inhibiting codes were positively associated with parent report of adolescents' depressive symptomatology. Girls were marginally more likely than boys to receive problem-focused (r = -.23, p = .06) and facilitative engagement (r = −22, p = .07) parental responses. White parents were more likely to respond punitively (r = .27, p =.03), whereas parents of color were marginally more likely to respond with autonomy-inhibiting behaviors (r = .22, p = .07). No other demographic variables were associated with the observational codes. Table 1 displays the psychometric properties of the observed parental emotion socialization codes.

To facilitate data reduction and determine factor structure, the seven subscales were subjected to a principal components analysis. We found an optimal three-factor solution revealing an interpretable simple structure with factor loadings above 0.40. The first factor, *emotion-dismissing* (α = .55), accounted for 35% of variance and consisted of the (negatively loading) *emotion-focused (EF)* reaction, *punitive* reaction, and *autonomy-inhibiting* reaction. The second factor, *emotion-coaching (*α = .87), accounted for 21% of the variance and consisted of the *problem-focused* and *facilitative engagement* codes. The third factor, *parental distress (*α = .39), accounted for 15% of the variance and consisted of the *magnifying* and (negatively loading) *minimizing* codes.

For this paper, we were only interested in testing the parental responses of emotion-coaching and emotion-dismissing as these most closely resembled the a priori conceptualizations of PES discussed above (Gottman et al., 1997). Because the emotion-dismissing factor had low internal consistency, likely due to highly non-normally distributed indicators of this factor and unclear theoretical rationale for this particular structure, we used the individual subscales of punitive and autonomy-inhibiting responses. (Upon closer scrutiny, the reverse-

scored emotion-focused response did not seem to theoretically capture the meaning for which it was intended. We thus omitted this subscale from subsequent analyses). Due to non-normality of the punitive and autonomy-inhibiting responses, we dichotomized these variables at 0 (absence) and 1 (any presence) and tested them in separate models for all hypotheses. We standardized and then averaged the continuous problem-focused and facilitative engagement subscales to form the emotion-coaching factor variable. In total, we used three PES variables, emotion-coaching (i.e., problem-focused, facilitative engagement) and punitive and autonomy-inhibiting responses, the latter two approximating the emotion-dismissing construct.

Results

Bivariate relationships

Notable in Table 1 is the lack of significant correlation between aggregate negative mood and substance use assessments. However, this is consistent with previous studies that fail to find main effects for negative mood on substance use (e.g., Hussong et al., 2008). Researchers have thus pursued testing of moderation models to help clarify for whom and under what conditions the daily negative mood-substance use relation may indeed hold. Aggregate negative mood was largely unrelated to any of the PES variables, and aggregate substance use was negatively associated with emotion-coaching variables but unrelated to the emotion-dismissing indicators. As this is the first study to examine observed PES in relation to experience sampling assessments, to negative mood (vs. internalizing symptomatology), and to substance use (vs. broad externalizing behavior), lack of significant relationships may not be unexpected. Methodological and measurement issues may play a role in how these variables ultimately relate to one another.

Analytic approach

Mixed modeling (Bryk & Raudenbush, 1992) was used to test the moderation of PES on the short-term temporal link between negative mood and subsequent substance use. Following Raudenbush and Bryk (2002), daily negative mood on level 1 was person-centered to examine whether the use of substances on any given day was related to higher negative mood than was typical for a given individual. On level 2, grand-mean centered PES indicators predicted inter-individual variation in substance use and in the covariation between daily negative mood and substance use. In order to obtain unbiased between-person effects of mood on daily substance use, we included on level 2 an aggregate negative mood variable across daily reports for each person (Raudenbush & Bryk, 2002, pp. 134). Because daily substance use was a binary variable, all models were estimated in HLM 6.0 (Raudenbush, Bryk, Cheong, & Congdon, 2004) using a log-link function with a Bernoulli distribution (correcting for overdispersion). As intra-individual processes over time were of interest, effects were interpreted using unit-specific models with robust standard errors. All models were tested for the effects of outlying or suspicious cases due to poor engagement in the parent-adolescent interaction (N=1), extreme responding (N=1 for substance use), and a high frequency of missing daily data (N=3). Few substantive changes were noted, although omitting the one extreme responder resulted in the model for Hypothesis 2 involving the three-way interaction among EC reactions, punitive reactions, and daily negative mood to

move from marginal significance to significance (β = 1.18, p<.001). No associations were found between theoretically relevant demographic variables (adolescent gender, race/ethnicity, age, social desirability and parent education) and substance use and thus no covariates were included in subsequent models.

Baseline model

In the baseline model predicting daily reports of substance use, level one predictors included person-centered negative mood as well as weekday status (i.e., whether the day of assessment was on a weekend of weekday). The random effects of the model intercept and the (slope for) daily effect of negative mood on substance use were also estimated. No significant relation between negative mood and substance use was found across individuals in this model (β= −0.44, ns). Moreover, weekday status was not associated with daily substance use (β =0.11, ns). The random effect for the model intercept (for daily substance use) was significant (ψ=6.5, χ^2 (61) = 2089.39, p<.001) indicating that there was significant variability about the mean of substance use. However, the random effect of the negative mood-substance use slope parameter was non-significant (ψ=1.94, χ^2 (61) = 81.2, ns). All models thus excluded weekday status and the random effect for the negative mood-substance use yielding the final baseline equation from which all subsequent models were constructed: $\acute{\eta} = \beta_{00} + \beta_{10}$*Daily Neg. Mood + r_0 + e.

PES dimensions

The first hypothesis tested whether each of the forms of PES independently moderated the daily covariation between negative mood and substance use. The first mixed model tested the buffering effect of EC on self-medication specifically by examining the two-way cross-level interaction between EC and daily negative mood predicting daily substance use. Although EC did not significantly moderate the self-medication process (β = −0.11, ns), there was a significant main effect for EC such that adolescents were 2.44 times less likely to use substances on any given day with every unit increase in parental EC reactions (β = −0.89, p=.05; see Table 2.) Two additional models found that neither punitive (β = 0.36, ns) nor autonomy-inhibiting (β =0.12, ns) ED reactions moderated mood-use relations or predicted daily substance use (see Table 2).

PES styles

We tested whether PES styles moderated mood-use relations in two separate models that included the interactions between EC reactions and each of the ED reactions (i.e., punitive and autonomy-inhibiting reactions) in addition to main effects for each (see Table 3). A marginally significant three-way interaction emerged among the EC reaction, punitive reaction, and daily negative mood (β = 0.62, p=.06) and a significant three-way interaction emerged among the EC reaction, autonomy-inhibiting reactions, and daily negative mood (β = 1.72, p<.001; see Table 3). Following Bauer & Curran (2005) and Curran, Bauer, and Willoughby (2006), we probed these effects by plotting the daily negative mood-substance use relation across varying levels of the continuous EC predictor (at the mean, +/− 0.5 SD, and +/− 1.0 SD) and the presence and absence of the punitive/autonomy-inhibiting parental response predictor.[1] Figure 1 shows that the self-medication pattern was evident for

adolescents whose parents displayed both a presence of punitiveness and increasingly higher levels EC behaviors (i.e., *overinvolved-critical* PES style).[2] In addition, a self-medication pattern was evident for adolescents whose parents demonstrated a style associated with both high levels of EC reactions and a presence of autonomy-inhibiting (AI) reactions (i.e., *overinvolved- inhibiting* PES style; see Figure 2). In sum, a risk pattern for adolescent self-medication emerged from PES styles characterized by relatively high EC behaviors coupled with either a presence of punitiveness or autonomy-inhibiting parental behaviors. This *over-involved* PES style was robust to both indicators of emotion-dismissing parental behavior, although this pattern was clearer for the autonomy-inhibiting indicator.

Discussion

The focus of this study was on the impact of a particular family-based mechanism, parental emotion socialization (PES), on the self-medication process among adolescents. Results did not support effects of emotion-coaching (EC) or emotion-dismissing (ED) parental reactions as independent moderators (i.e., dimensional approach) of the negative mood-substance use daily covariation. Although other work has demonstrated main effects findings for emotion-coaching or emotion-dismissing parental responses on adolescent outcomes (externalizing symptoms; e.g., Shortt et al., 2006), no study to date has examined effects of observed PES on adolescent affect regulation processes (e.g., self-medication), necessitating the testing of more complex two-way interaction analytic models (PES x daily negative mood). Thus, while we expected emotion-coaching and emotion-dismissing to moderate the daily co-variation between negative mood and substance use, our lack of support for these hypotheses is not inconsistent with the extant literature.

However, preliminary but promising support was found for the interactive effects of EC and ED reactions. Such interactive effects revealed a set of PES *styles* that appear to play a meaningful role in adolescents' negative mood-linked substance use. To our knowledge, this is one of only two studies to directly test and find evidence for the effect of parenting styles in the domain of emotion socialization (Lunkenheimer, Shields, & Cortina, 2007). Specifically, adolescents were more likely to self-medicate if their parents responded to their children's stress disclosures with emotion-dismissing *and* emotion-coaching behaviors. This *emotionally over-involved* PES style reflected an over-management or over-structuring response to children's stress that combined emotionally supportive and problem-focused responses with either emotion-disapproving reactions or autonomy-limiting behaviors. This pattern held when ED reactions were assessed as either punitive or autonomy-inhibiting,

[1]We selected EC standard deviations of +/− 0.5 and +/− 1.0 given the small number of adolescents with parents who demonstrated EC behaviors well beyond one standard deviation above or below the mean (i.e., 17% and 19% of sample with parents respectively showing EC behaviors less than and greater than one standard deviation below and above the mean.

[2]Two alternative patterns of increased likelihood for daily substance use emerged from the interactional effects of emotion-coaching and punitive PES responses, both not conforming to self-medication. First, adolescents whose parents demonstrated relatively low levels EC behaviors combined with an absence of punitiveness (i.e., disengaged PES style) were at relatively uniform risk for substance use on any given day regardless of the level of negative mood they were experiencing (see Figure 1). Second, adolescents whose parents demonstrated a presence of punitiveness but with the lowest levels of EC response (i.e., punitive-low coaching PES style) were at slightly elevated risk for daily substance use regardless of negative mood experienced within a given day. However, due to the low predicted probabilities of substance use and the small subgroup of adolescents (N= 6; 9% of sample) driving such an effect, we do not interpret these findings any further.

providing evidence for the robustness of this phenomenon, though it was stronger for the latter indicator.

Overinvolved PES styles may facilitate self-medication by restricting the development of healthy coping abilities in adolescents and opportunities for experiencing appropriate parental support. In our observational measures, parent-adolescent dyads showing an *overinvolved-inhibiting* style went beyond validating and responding to adolescents' emotions to the point of being relatively invasive and constraining. By using this style, parents may communicate to adolescents an inconsistent acceptance of their children's feelings and the need to manage adolescents' emotional experiences to conform to some parental standard. This may be similar to what Bateson, Jackson, and Haley (1962) termed the "double-bind" in which individuals feel that even if they act in a desired manner, the outcome may still be undesirable. As a result, adolescents lack confidence in their ability to cope with their daily mood and find parental support for dealing with their emotions to be ambiguous or confusing. Over time, adolescents may lose trust in parents for support and seek alternate means of coping with negative mood, such as substance use. Consistent with this interpretation, other research has shown that individuals who have strained relationships with their overly intrusive mothers tend to use more avoidant coping strategies in the face of negative affective stimuli (Ingram, Bailey, & Siegle, 2004) and respond to stress with greater defensiveness and lower deliberate affect regulation strategies (Glezerman, 2000). These coping strategies can then serve as a risk factor for self-medication. Thus, whether by compromising effective coping or diminishing unambiguous healthy parental support, the *over-involved* PES style, with its critical and autonomy-inhibiting sub-styles, appears to encourage self-medication likely due to adolescents' resulting difficulties with emotion regulation.

Strengths, limitations, and future directions

This is the first study to directly test the effects of parenting processes on adolescent self-medication using experience sampling methods (Hussong et al., 2008). Furthermore, this is the first application of a developmentally sensitive observational measure of PES. Taken together, these contributions help advance the extant literatures on both PES and adolescent self-medication. The current study demonstrated that more complex styles of PES best characterized the effects on self-medication, certainly a point for future work on emotion socialization to examine more thoroughly.

These strengths should be considered in light of the study's limitations. First, sample size was relatively small, thus limiting generalizability and power to detect small effects. Indeed, it was the case that only 25% of the sample used substances (on 60 occasions) during the three week sampling period. Thus, any significant effects of PES styles on adolescents' pattern of self-medication held for a relatively small number of participants. However, the fact that significant three-way interactions were found for such a small sample certainly warrants further exploration. Moreover, our sample reflected a greater prevalence of substance use than what large-scale normative studies of adolescents have revealed (e.g., Johnston et al., 2007), thus reflecting a unique sample of elevated risk against which to interpret our findings. Second, on balance, the magnitude of significant effects was small,

although these were conservative tests of the relation between PES and self-medication given that interaction effects are inherently small and that new and diverse methods of assessment were employed for the constructs of interest. Third, a limitation of the observational work involved low internal consistency for the emotion-dismissing factor, thus leading to changes in our analytic strategy. Replication of this coding system is particularly warranted. Relatedly, some adolescents had difficulty generating anything stressful to discuss with their parents during the summer months, thus potentially limiting the opportunity to observe more ecologically sound displays of parents' socialization of adolescents' stress and negative affect. As such, future studies may want to consider timing by assessing adolescents during the school year when more stressful events are likely to occur and parents may have more stress to manage for themselves. Fourth, directionality of the relation between PES and self-medication cannot be discerned from such a study, and thus it is important to entertain evocative or child-driven models, whereby adolescents' pre-existing characteristics provoke parenting behavior (e.g., Belsky, Lerner, & Spanier, 1984). Thus, to better assess directionality of effects in the long- and short-term, study designs should consider transactional models in which the adolescent, parent, and the adolescent-parent relationship all become targets of assessment over time. Finally, because punitiveness and autonomy-inhibiting parental responses were dichotomized across the duration of the 5-minute parent-adolescent interaction, the intensity or frequency of such responses within a given conversation remain unknown within our current analyses. Our findings indeed suggest that the mere presence or absence of these emotion-dismissing indicators has a significant effect on self-medication *only when* combined with emotion-coaching behaviors within the same parent-adolescent discussion. Future research that can help tease out both a dose-response and temporal relationship with such PES behaviors is certainly warranted.

There are several ways to enhance the study of PES and adolescent self-medication. First, because the field of PES of adolescents is still in its relative infancy, little is known about the similarities and differences between PES and other important parenting constructs relevant for adolescents (Gondoli & Braungart-Rieker, 1998). Future studies would benefit from applying a developmental framework to the study of PES and from examining the unique contribution of emotion socialization above and beyond other related parenting constructs. Second, that a construct like parental support can fluctuate across adolescence (Juang & Silbereisen, 1999) generates awareness of the notion of stability and change in PES and how different manifestations of PES over time may predict changes in self-medication. However, if the styles of PES found in this study are robust to time and place, we should see adolescents whose parents demonstrate over-involved styles of emotion socialization at even higher risk for self-medication over time as they encounter increased stressors and experience greater developmental demands upon navigating through high school. Finally, the current study does not address mechanisms of effect of PES. It appears that the effect of PES on adolescent adjustment functions in part through emotion-regulation (e.g., Shortt et al., 2006). Thus, extending the current study to include intrapersonal mechanisms of action may provide additional support for how self-medication may function as a compromised self-regulation system.

Implications and conclusion

Our study shows promise for particular PES styles that serve as risk mechanisms for adolescent self-medication. Although findings are preliminary, this study can lend practical information to families and practitioners if confirmed. If it is indeed the case that parents who demonstrate over-involved styles of PES may increase the risk for self-medication in their adolescents, then families would benefit from interventions that target parents' awareness of how they interact with their adolescents around affectively charged personal issues. This may be particularly important for parents struggling with heightened negative emotion or those more vulnerable to mismanagement of their children's affect (e.g., Dix, 1991). Ultimately, parents could be taught skills of emotional engagement, learn to examine the effect of their own personal issues (e.g., depression, emotional distress) on their adolescents' mood regulation, and seek out more balanced ways of communicating (Nystul, 2002) that may help build adolescents' emotion-regulation capacities and thus lower risk for self-medication.

Although promising, this study is only a first step in uncovering parenting processes related to adolescent self-medication tendencies. However, if we are to more deeply understand how self-medication develops in more vulnerable populations, it is imperative that we turn to theoretically relevant predictors like PES, as this construct can help us understand both the potential root cause of self-medication (i.e., self-regulation and coping difficulties) as well as the link to interpersonal (i.e., parent-adolescent relationship) mechanisms of risk related to both emotion and substance use.

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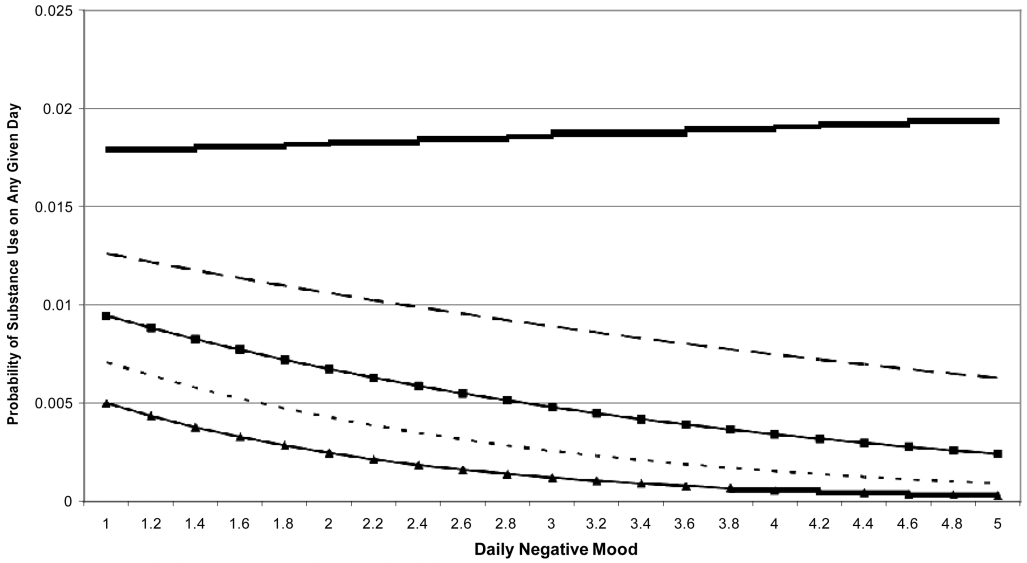
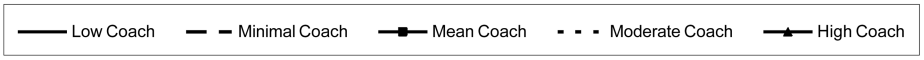
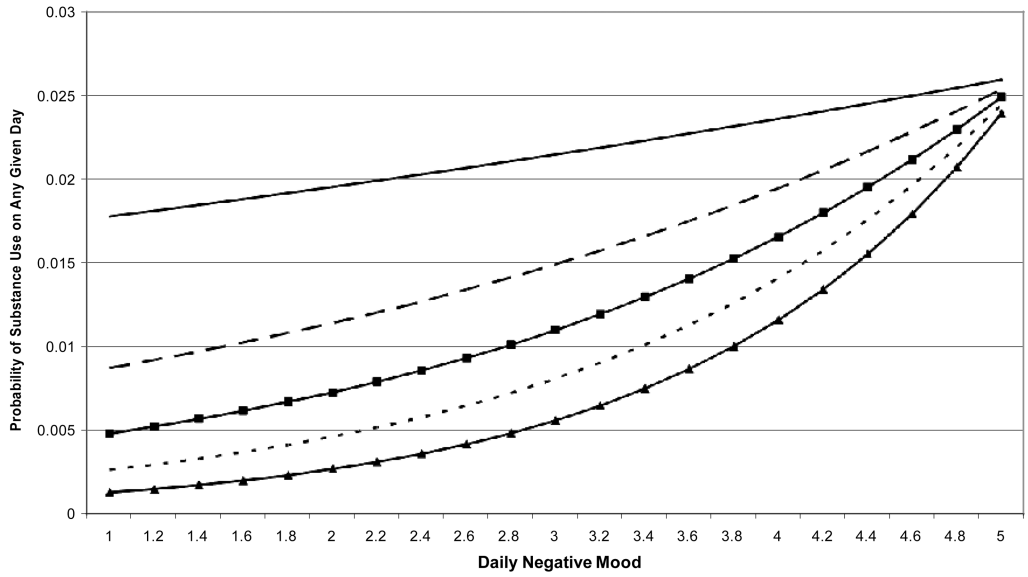


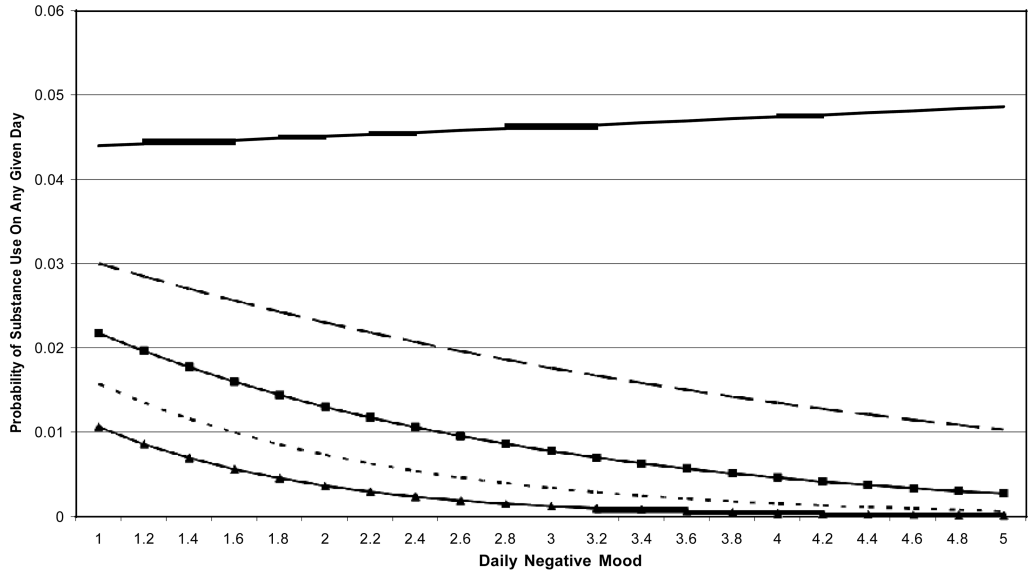
Note. Graph above represents absence of punitiveness.



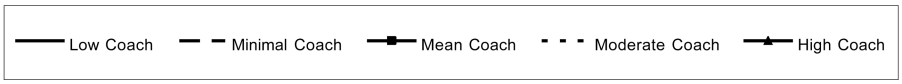


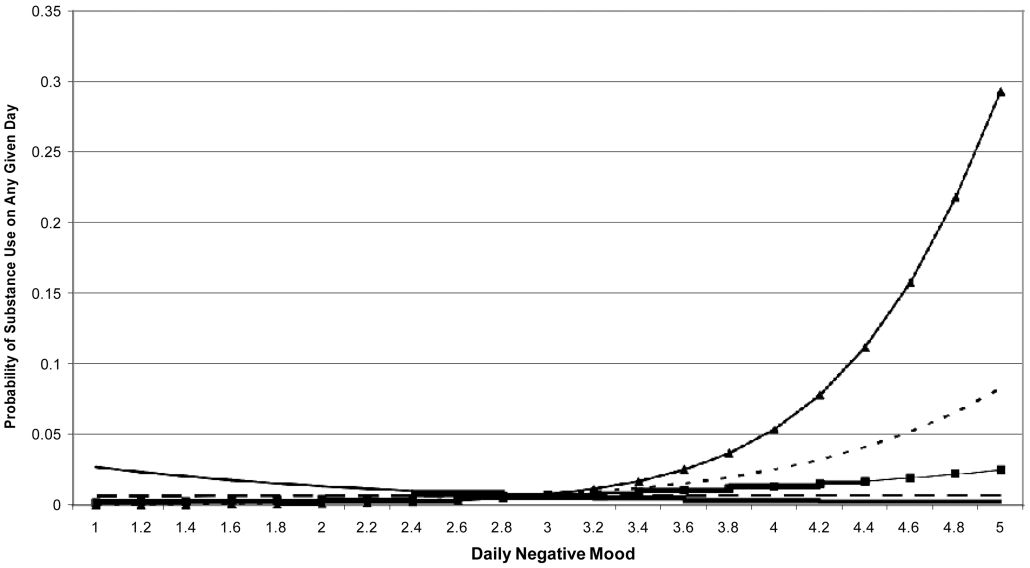
Note. Graph above represents presence of punitiveness.

Figure 1.
Emotion-coaching and punitive responses moderate self-medication



Note. Graph above represents absence of autonomy-inhibiting.





Note. Graph above represents presence of autonomy-inhibiting.

Figure 2.
Emotion-coaching and autonomy-inhibiting responses moderate self-medication

Table 1

Intercorrelations Among Variables of Interest

	1	2	3	4	5	6	7	8	9	10	11
1. Social Desirability	---										
2. Parent Education	.13	---									
Experience Sampling Measures											
3. Aggregate Negative Mood	.21^{+}	−.08	---								
4. Aggregate Substance Use	−.13	.13	.08	---							
Parental Emotion Socialization Codes											
5. Problem-focused	.28*	.11	−.15	−.22^{+}	---						
6. Facilitative Engagement	.11	.30*	−.15	−.26*	.78**	---					
7. Emotion-focused	−.07	.27*	−.21^{+}	−.17	.06	.37**	---				
8. Minimize	.13	−.06	.18	−.10	−.05	−.25*	−.11	---			
9. Punitive	.09	−.01	.18	.14	−.16	−.38**	−.28*	.25*	---		
10. Magnify	−.10	−.09	−.06	.05	−.32**	−.14	.01	−.38**	−.07	---	
11. Autonomy-Inhibiting	−.09	−.26*	−.17	−.05	−.14	−.35**	−.20	.15	.30*	.09	---
Psychometric Properties for PES											
ICC					.59	.77	.80	.70	.65	.73	.79
Mean					2.31	3.15	1.69	1.53	1.21	1.51	1.67
(Sd)					(.60)	(.92)	(.51)	(.49)	(.32)	(.45)	(.73)
Range					1.0–3.7	1.3–5.0	1.0–3.2	1.0–3.0	1.0–2.2	1.0–2.8	1.0–3.6

Note. All correlations based on N of 65. Experience sampling measures were aggregated across the 21-day period. Punitive and autonomy- inhibiting parental responses retained their original continuous scaling for these correlations;

$^{+}$p<.10,

*p<.05,

** p<.01;

PES=parental emotion socialization; ICCs represent the averaged ratings of the three coders

Table 2

Multilevel Models for Emotion-Coaching, Punitive, and Autonomy-Inhibiting Reactions Predicting Self-Medication

	Emotion-Coaching Predictor Model			**Punitiveness Predictor Model**			**Autonomy-Inhibiting Predictor Model**		
Outcome: Daily Substance Use	*B*	*t*	*OR*	*B*	*t*	*OR*	*B*	*t*	*OR*
Daily negative mood (NM)	−.05	−.20	.95	−.19	−.49	.83	−.04	−.14	.96
Parental emotion socialization (PES)	−.89	−1.98^{+}	.41	.54	.64	1.71	−.75	−.91	.47
PES x NM	−.11	−.66	.89	.36	.78	1.43	.12	.28	1.13

Note. N=65; Observations=1116; D.f. = 1112 for the interaction term; OR=odds ratio;

$^{+}$p< .10,

*p< .05.

Table 3

Multilevel Models for the Respective Interactive Effects of Punitive and Autonomy-Inhibiting Reactions by Emotion-Coaching Reaction on Self-Medication

	Punitive Model			Autonomy-Inhibiting Model		
Outcome: Daily Substance Use	**β**	***t***	**OR**	**B**	***t***	**OR**
Daily negative mood (NM)	−.34	−.77	.71	−.52	−.92	.36
Emotion-coaching (EC)	−.91	−2.09*	.40	−1.03	−2.27*	.36
Emotion-dismissing PES predictor (ED)	.07	0.90	1.08	−1.12	−1.32	.33
EC x NM	−.33	−1.34	.72	−.50	−1.61	.61
ED x NM	.76	1.35	2.13	1.12	1.74+	3.08
EC x ED x NM	.62	1.83+	1.86	1.72	3.66**	5.60

Note. N=65; Observations=1116; D.f. = 1109 for the three-way interaction term; Results are from simultaneous regression analysis;

+ p< .10,

* p < .05,

** p<.01.