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Is hoping the same as expecting? Discrimination between hopes and response expectancies for nonvolitional outcomes[★]

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Abstract

Despite the large literature on response expectancy effects, it is not clear to what degree individuals' hopes are associated with their response expectancies for nonvolitional outcomes. Indeed, it is not clear whether these two constructs are separate. The present study sought to: (1) determine if participants can distinguish between expectancies and hopes; and (2) examine the relations between expectancies and hopes in regard to non-volitional outcomes. Seventy-three volunteers completed items regarding 10 non-volitional outcomes, as well as measures of dispositional traits (i.e. optimism, pessimism, suppression). The results revealed significant differences between expectancies and hopes ($P < 0.001$), and that these constructs were also correlated. Dispositional traits and prior experience were also found to contribute to hopes and expectancies.

Keywords

Response expectancy; Hope; Traits; Experience; Nonvolitional outcomes

The role of cognitive factors (i.e. expectancies) in learning (e.g. Tolman & Honzik, 1931) and the production of behavior (Rotter, 1954) has long been recognized, but the impact of such cognitive factors on nonvolitional outcomes is a much more recent theoretical development. Kirsch (1985) was perhaps the first to explicitly theorize on relations between what individuals expect and their experiences of seemingly automatic responses. He termed such beliefs concerning nonvolitional outcomes, "response expectancies", and explicitly hypothesized that response expectancies are: sufficient to cause nonvolitional outcomes; not mediated by other psychological variables; and self confirming while seemingly automatic. Since that time, the literature has grown to support the strong role of response expectancies as a psychological mechanism for producing nonvolitional outcomes in three areas of research: (1) placebo effects (Montgomery & Kirsch, 1996, 1997; Price, Milling, Kirsch, Duff, Montgomery, & Nicholls, 1999); (2) the effects of hypnotic suggestion (Montgomery, Weltz, Seltz, & Bovbjerg, 2002; Schoenberger, Kirsch, Gearan, Montgomery, & Pastyrnak, 1997); and (3) effects of pharmacological agents (Kirsch & Rasadino, 1993; Lansky & Wilson, 1981; Montgomery & Bovbjerg, 2000; Montgomery et al., 1998; Roscoe, Hickok,

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& Morrow, 2000). Additional evidence has suggested that response expectancies influence memory reports, pain perception, responses to psychotherapy, sexual arousal, asthmatic responses, and mood (Kirsch, 1999). Despite this growing literature on the powerful effects of response expectancies in a variety of contexts, less is known about the components of the construct itself. Specifically, it is not known whether individuals' hopes are associated with their response expectancies. Determination of the relations between these two constructs is a necessary first step to be taken before relative contributions of hopes and response expectancies to nonvolitional outcomes should be explored.

Existing literature has indicated that individuals' hopes are an important determinant of the success of psychotherapy, personal achievement, problem-solving ability, and health related concerns (Frank, 1973; Snyder, Sympson, Michael, & Cheavens, 2001). However, it should be noted that the focus of the hope research was on the prediction of behavior rather than on the experience of nonvolitional outcomes (e.g. side effects of aversive medical treatments). Although Kirsch (1990) discusses patient hopes as positive response expectancies that can be reinforced by patient gains, the relation between hopes and expectations is not developed further. For example, it is possible that one might "hope" that an impending venipuncture will be painless, but "expect" it to hurt a moderate amount. While such patients would traditionally be assessed for their response expectancies concerning pain (e.g. How much pain do you expect to feel?), it is not clear at this time whether they would be reporting an estimate of anticipated future pain intensity or rather their hopes in regard to their nonvolitional response to the venipuncture procedure (How much pain do you hope to feel?). Although the idea has been suggested (Andrykowski & Gregg, 1992), to our knowledge it has not been empirically established in the literature that participants can reliably distinguish between what they think will happen (the estimate of future intensity that is traditionally used in response expectancy assessment) and what they hope will happen when predicting future nonvolitional outcomes. It would seem reasonable that individuals can achieve such discrimination, but then the question of the magnitude of relations between expectations and hopes remains open. That is, the constructs could be closely related or orthogonal.

Current theory on hope suggests that the construct is defined by two components: agency thoughts and pathway thoughts (Snyder et al., 2001). Together, they are described as belief in one's ability to produce outcomes and one's ability to generate strategies to achieve desired outcomes. Both types of thoughts are described as expectancies for behavior rather than for nonvolitional outcomes. Indeed, the assessment of hopes in both children (Snyder et al., 1997) and adults (Snyder, Sympson, Ybasco, Borders, & Babyak, 1996) seems to lack distinction from expectancies despite face valid distinctions in common usage. For example, examination of the leading hopes scale for adults reveals that individuals are asked to report on what they think in regard to future behavioral outcomes rather than on what they hope (Snyder et al., 1996). While such assessment methods have been productive for prediction of behavior (see Snyder et al., 2001), these practices may inadvertently further obfuscate the distinction between hopes and expectancies in regard to nonvolitional outcomes. It appears that the present state of both the hope and expectancy literatures highlights the need for a study which seeks to disentangle hopes from response expectancies using a face valid approach. Such information would be highly applicable to clinical settings in which the control of nonvolitional outcomes (e.g. pain, nausea) is frequently a primary clinical goal.

Response expectancies for nonvolitional outcomes may be dependent upon individual trait characteristics rather than on situational factors. That is, individuals' expectancies and their hopes could be determined by whether or not they are in general optimistic or pessimistic. It is reasonable to suggest that individuals who are more optimistic might both expect and hope for less aversive and more positive outcomes, and that individuals who tend to be

pessimistic might both expect and hope for more negative and less positive outcomes (Snyder et al., 2001). Additionally, individuals who are high on suppression, defined as a conscious desire to suppress thoughts (Wegner & Zanakos, 1994), might consistently score higher on expectancy items for aversive outcomes. This hypothesis is based on previous research suggesting that confrontation with a stimulus leads to greater negative consequences in individuals who tend to suppress (Wegner & Smart, 1997). In regard to expectancies, we anticipate that high suppression will predict greater negative expectancies, as the assessment of expectations will force individuals to confront potentially suppressed material.

Previous experience may also play a role in individuals' abilities to discriminate between hopes and response expectancies. Prior research has indicated that previous experience in context specific situations is a powerful determinant of expectations in both experimental (Montgomery et al., 1997) and clinical settings (Montgomery & Bovbjerg, 2000). One recent study (Montgomery & Bovbjerg, in press) exemplifies these relations. In a sample of 80 breast cancer patients undergoing an outpatient chemotherapy regimen, past experience of nausea accounted for 48, 68, and 51% of the variance in patients' expectations of nausea at the second, third and fourth chemotherapy infusions. These findings are consistent with hypotheses derived from Social Learning Theory (Rotter, 1954, 1982). For example, individuals who consume more coffee may base their expectations of how energized they might be following coffee consumption more on past experience and less on their hopes. Specifically, past experience may be a factor which fosters the discrimination of expectations from hopes. One could hypothesize that more past experience leads to greater differences between expectations and hopes.

Based on the growing recognition of the impact of response expectancies on nonvolitional outcomes in both clinical and laboratory settings, it is important to improve understanding of what constitutes a response expectancy. The primary aims of the present study were to: (1) determine if participants can distinguish between their response expectancies (estimates of likelihood) for the occurrence of nonvolitional outcomes and their hopes regarding the occurrence of nonvolitional outcomes; and (2) examine the relations between what participants expect and what they hope for in regard to non-volitional outcomes. In secondary analyzes, we will also explore the possibilities that stable characteristics (optimism, pessimism, and suppression) predict response expectancies and that past experience aids in the discrimination of hopes from expectancies.

1. Method

1.1. Participants

Participants were 56 female and 17 male undergraduate students, ranging in age from 18 to 23 years old (mean age=20.61, S.D.=1.09) who had volunteered to participate in this study. The sample was predominantly Caucasian (97%), and 10% of the sample was married. Participants were asked to complete a brief questionnaire at the conclusion of a lecture. Four participants were excluded due to missing items on one or more of the measures (see later).

1.2. Measures and procedure

Participants' hopes and response expectancies were assessed with face valid visual analogue scales for ten scenarios involving events with associated nonvolitional outcome (e.g. drinking caffeinated coffee, drinking alcohol, smoking a cigarette, upcoming surgery, exercising, taking an exam, and eating chocolate). Expectancy items were consistent with previously published methodology (Montgomery & Bovbjerg, 2000, 2001; Montgomery et al., 1998). Specifically, participants were asked to indicate how _____ they thought/

expected they would feel. Analogously, for each item they were also asked how _____ they “hoped” to feel. There were six positive valence outcome scenario items (e.g. feeling relaxed after smoking a cigarette) and four negative valence items (e.g. feeling anxious prior to an exam). Participants were also asked to report how many days during the past month they had experiences relevant to the ten outcome scenarios (e.g. On how many days during the past month did you drink caffeinated coffee?), and to complete measures of stable individual characteristics. The selection of a one month time window for assessment of past experience was based on our experience with patients’ reports of symptoms over similar time periods (Montgomery & Bovbjerg, 2000, 2001, in press).

Measures of stable individual characteristics included the Life Orientation Test (LOT) (Scheier & Carver, 1985) and the White Bear Suppression Inventory (WBSI; Wegner & Zanakos, 1994). One might also suggest that people high in trait anxiety might have more negative expectancies, however, we have excluded trait anxiety from the present investigation for two reasons: (1) in previous research, trait anxiety tended to be poorly correlated with both expectancies and clinical outcomes (e.g. Montgomery et al., 1998); and (2) suppression has been demonstrated to correlate with trait anxiety (Wegner & Zanakos, 1994), and therefore exclusion of trait anxiety also avoids potential problems with multicollinearity among dispositional predictors.

The Life Orientation Test (Scheier & Carver, 1985) is a 12-item measure assessing dispositional optimism and pessimism. The LOT was included in this study as it is possible that these constructs may moderate relations between expectancies and hopes, as previous research has indicated that optimism and hopes are correlated (Snyder et al., 2001). The scale has demonstrated good reliability and validity (Scheier & Carver, 1985).

The WBSI (Wegner & Zanakos, 1994) measures dispositional suppression, defined as the conscious desire to suppress thoughts. In individuals who tend to suppress, it has been demonstrated that confrontation with a stimulus leads to greater negative consequences. In regard to expectancies, we anticipate that high suppression will predict more negative expectancies, as the assessment of expectations will force individuals to confront potentially suppressed material. The WBSI is a 15-item measure that has demonstrated good reliability and validity (Wegner & Zanakos, 1994).

1.3. Statistical analyses

The overall approach to the statistical analyses was to first examine differences between expectancies and hopes with repeated measures analyses of variance (rANOVA). Significant main effects and interactions were then explored by examining the potential for differential effects within positive and negative valence items. Second, correlations between expectancy and hope were examined to determine whether these constructs are orthogonal. Third, the influence of stable individual characteristics (optimism, pessimism, suppression) on expectancies and hopes was evaluated using these factors as predictors in the rANOVA approach. The influence of stable characteristics on positive and negative valence items was also addressed. Fourth, the association between prior experience and subsequent hopes and response expectancies was examined first in biserial correlations, and then using multiple regression to determine the unique statistical contributions of stable characteristics and prior experience to specific outcome scenarios. Outcome scenarios were analyzed independently, with the exception that the four smoking items and four coffee items were each grouped together in regression to decrease the overall number of analyses performed. Due perhaps to the use of student volunteers in the sample, there was very little variance in the past history of prior surgery item (most had no prior history of surgery), and therefore the analyses of surgically related expectancies and hopes (four items) were not conducted. Preliminary

analyses of effects of gender on expectancies and hopes were not significant ($P>0.50$), and therefore gender was not included as a variable in subsequent analyses.

2. Results

In order to determine if participants can distinguish between expectancies and hopes regarding the occurrence of nonvolitional events, the 10 assessments of expectancies and 10 assessments of hopes were entered into a repeated measures analysis of variance (rANOVA). The rANOVA had two repeated factors: Assessment (2 levels—Expectancy vs. Hope) and Outcome (10 levels).¹ Mean scores for expectancy and hope items are presented in Fig. 1. Results of the rANOVA revealed that across outcomes, participants could discriminate between their expectations and hopes [$F(1, 72)=170.48, P<0.0001$], and that the magnitude of the difference between expectancies and hopes is dependent on outcome items [Assessment \times Outcome interaction: $F(9,648)=98.77, P<0.0001$]. To explore the source of this interaction, Assessment items were subdivided into positive (4 Outcomes—8 items) and negative (6 Outcomes—12 items) valence items, and two separate rANOVAs were performed. The rANOVA for positive Outcomes revealed a significant effect for Assessment [$F(1, 72)=65.07, P<0.0001$], however, no significant interaction term ($P>0.16$). Analyses of negative valence items also indicated that participants could discriminate between expectancies and hopes [$F(1, 72)=556.65, P<0.0001$], as well as a significant Assessment \times Outcome interaction [$F(5, 360)=44.51, P<0.0001$]. Examination of means revealed that participants were able to discriminate between expectancies and hopes in all cases (alpha levels ranging from $P<0.02$ to $P<0.0001$; see Fig. 1).

Relations between hopes and expectancies were also investigated. Although rANOVA revealed significant differences between individuals' expectancies and hopes, Fig. 1 would suggest they are not orthogonal. Indeed, correlations between expectancies and hopes ranged from 0.08 to 0.65 for the 10 outcomes, and 9 out of the 10 correlations were significant (see Table 1). Mean correlation for positive valence items was $r=0.58$, negative valence items $r=0.35$, and overall $r=0.45$.

To evaluate the statistical contribution of stable characteristics (optimism, pessimism, suppression) to response expectancies, these three variables were entered as predictors into the rANOVA described earlier. Results of the simultaneous regression output are reported here, as there was no conceptual reason to give any of the variables primacy in a hierarchical regression approach. This analysis revealed main effects for pessimism [$F(1, 69)=4.16, P<0.05$], and suppression [$F(1, 69)=5.13, P<0.05$], but not for optimism [$F(1, 69)=0.68, P<0.42$]. Across all items, higher pessimism scores and higher suppression scores were associated with higher expectancy and hope scores. Interestingly, the difference between expectancies and hopes was no longer significant [Assessment: $F(1, 69)=0.02, P<0.89$], while the interaction between pessimism and Assessment remained significant [$F(1, 69)=4.98, P<0.05$] with these additional predictors in the model. Analyses of the correlations indicate that pessimism was positively correlated with expectancies ($r=0.35, P<0.01$) across items, but not with hopes ($r=0.24, P>0.28$). These results suggest a moderating influence of pessimism on the difference between expectancies and hopes, however, from these analyses it is not clear whether effects are similar for positive and negative valence items.

As effects for stable characteristics were significant above, two additional regression equations were calculated, one for positive and one for negative valence items, with optimism, pessimism and suppression as predictors in each. No main effects were revealed

¹As the magnitude of differences in expectations and hopes by outcome are tangential to the primary aim of this manuscript, results concerning the Outcome effect are not reported.

for prediction of the positive valence items by stable characteristics [optimism: $F(1, 69)=0.53, P>0.47$; pessimism: $F(1, 69)=2.73, P>0.10$; suppression: $F(1, 69)=2.80, P>0.10$], and there was also no main effect for Assessment [$F(1, 69)=0.24, P>0.62$]. However, Suppression did interact with Assessment [$F(1, 69)=6.89, P<0.02$]. Correlational analyses indicated that higher Suppression scores were associated with higher hopes scores across positive valence items ($r=0.30, P>0.01$), but were not associated with expectancy scores ($r=0.01, P>0.94$) across the same items. No other interactions were significant ($P>0.50$ in both cases).

Analyses of negative valence items also revealed no main effects for stable characteristics [Optimism: $F(1, 69)=0.14, P>0.70$; Pessimism: $F(1, 69)=1.17, P>0.28$; Suppression: $F(1, 69)=1.83, P>0.18$] or Assessment [$F(1, 69)=0.07, P>0.79$]. Assessment did significantly interact with both Pessimism [$F(1, 69)=5.64, P<0.03$] and Suppression [$F(1, 69)=5.05, P<0.03$], but not with Optimism [$F(1, 69)=1.31, P<0.26$]. Analyses of the correlations indicate that both higher Pessimism scores and higher Suppression scores are associated with higher expectancy scores across negative valence items (Pessimism: $r=0.27, P<0.03$; Suppression: $r=0.28, P<0.02$). Neither Pessimism nor Suppression was correlated with hopes ($P>0.98$ in both cases).

In order to examine the effects of previous experience on expectancies and hopes, correlations between experience, expectancies and hopes were examined (see Table 2). Consistent with hypotheses, past experience was related to individuals' hopes and expectancies.

As a next step, analyses were conducted to determine the relative statistical contributions of stable characteristics and prior experience to expectancies and hopes. As prior experience is a specific predictor, separate regression equations were performed for each outcome scenario. As four items pertained to smoking, and four to drinking coffee, these items were combined into two separate regressions rather than four to reduce the overall number of analyses. There was no main effect of prior experience, optimism, or pessimism on expectancies and hopes concerning anxiety before an exam ($P>0.20$ in all cases), however there was a main effect for Suppression [$F(1, 68)=4.67, P<0.03$], and a significant Suppression \times Assessment interaction [$F(1, 68)=4.67, P<0.03$]. Correlational analyses revealed that Suppression was significantly related to the expectancy item for exam-related anxiety ($r=0.34, P<0.003$), but not to the hope item ($r=0.06, P>0.58$). There was a significant main effect of prior experience on expectancies and hopes concerning tiredness following exercise [$F(1, 68)=9.93, P<0.003$], but no other main effects ($P>0.33$ in all cases). In addition, a significant interaction of prior experience and Assessment was detected [$F(1, 68)=12.20, P<0.0008$], indicating that individuals who had greater prior experience with exercise expected to feel less tired following exercise (see Table 2). Main effects for past smoking [$F(1, 68)=11.27, P<0.002$], chocolate eating [$F(1, 68)=6.90, P<0.02$] and coffee drinking experiences [$F(1, 68)=9.08, P<0.004$] were revealed, however, no other significant main effects or interactions were found with these variables. In addition to a main effect for past experience for alcohol consumption [$F(1, 68)=6.10, P<0.02$], there was also a significant Suppression \times Assessment interaction [$F(1, 68)=4.57, P<0.04$], indicating that Suppression was significantly related to the hope item ($r=0.24, P<0.05$), but not to the expectancy item ($r=0.05, P>0.68$).

3. Discussion

The results of the present study revealed that individuals can discriminate between their hopes and expectancies. Overall, hope scores tended to be lower than expectancy scores for negative valence items, and higher than expectancy scores for positive valence items. This is

not to imply, however, that participants displayed ceiling effects in regard to hopes for positive valence items, or floor effects in regard to negative valence items (as might be predicted from a common sense perspective). According to the present results, hopes and expectancies were related. Expectancies and hopes were correlated for 9 out of the 10 outcome scenarios assessed. The overall pattern of the data indicated that expectancies and hopes are independent but related constructs. These data strongly suggest that research in the area of response expectancy effects consider that hope may contribute to expectancy. In addition, there is also the possibility that hope may make an independent contribution to nonvolitional outcomes as hope appears to be an independent construct.

Stable individual psychological characteristics were demonstrated to be related to hope and expectancy. Across all outcome scenarios, both pessimism and suppression were associated with participants' hopes and expectancies. Closer examination of the associations between stable characteristics and positive and negative valence items separately indicated that the main effects described earlier were represented as interactions within the smaller sets of outcome scenarios. That is, among positive valence items suppression was differentially associated with hopes and expectancies. Among those items, greater suppression lead to higher hope scores, and was unrelated to expectancy scores. Perhaps this finding is due to the failure of suppressive tendencies to activate expectancies in regard to positive outcomes, which in turn leads to greater hopes for positive outcomes, however, this point is purely speculative at this time and deserves further research attention. Among negative valence items, again there were no main effects and only interactions. Both greater pessimism and suppression were predictive of greater expectations for negative valence items, but neither correlated with participant hopes. These data are consistent with theory (Wegner & Smart, 1997; Wegner & Zanakos, 1994) which suggest that when high suppressors have cognitive sets activated (in this case by the stimulus of the questionnaire items), they will tend to report more negative expectations. The statistical contribution of pessimism also appears to be more focused on expectancies than hopes, which may relate to more rational appraisal by pessimistic thinkers akin to the construct of depressive realism (Alloy & Abramson, 1988). The data suggest that the source of expectancies and hopes may be partially dependent on the valence of the anticipated outcome. The negative valence items used here are more consistent with much of the expectancy research in clinical medicine (e.g. expectancies for pain, nausea), and therefore suggest that use of these brief measures for pessimism and suppression may identify patients most likely to hold more negative expectations.

The analyses of the association between prior experience and subsequent hopes and expectancies revealed a strong relationship between prior experience and expectancies. Prior experience was correlated with six of eight expectancy and three of eight hope items. Regression analyses revealed a similar pattern, indicating main effects of experience for tiredness, smoking, chocolate eating, and alcohol consumption items. However, suppression was the only variable to correlate with anxiety before an exam. The influence of suppression was somewhat inconsistent overall, in that suppression was associated with expectations of anxiety prior to an exam, but not to hopes concerning alcohol consumption. In general, the overall pattern of the results appears to indicate that prior experience makes a strong statistical contribution to expectancy and somewhat less of a contribution to hope. In addition, once prior experience is accounted for in the statistical model, it seems that trait characteristics make less of a statistical contribution. Overall, relations between past experience and expectancies are consistent with a social learning theory approach (Rotter, 1982), which suggests that situational experience plays an important role in determining expectations. Although it has also been suggested that past experience is associated with hopes in the behavioral context (Snyder et al., 2001), these relations were less consistent here.

The present study has four limitations. First, the study sample consists of healthy college students who may have relatively less prior experience with the study outcome scenarios to draw upon. However, the lack of prior experience did not appear to severely inhibit relations between experience, expectancies, and hopes, and the present data offer justification for pursuing this line of research in other (e.g. patient) samples. Second, the study is correlational in nature. Based on these results, a follow-up study appears warranted to examine whether experimentally controlled changes in experience affect hope and expectancy differentially against the backdrop of stable individual psychological characteristics. Third, the present study does not correlate hopes and expectancies prospectively with nonvolitional outcomes. Although such a prospective study design is clearly the next step in this line of research, to do so before establishing hopes and expectancies as separate constructs would have been premature. Fourth, in order to estimate the relations between stable characteristics and past experience with expectancies and hopes, a large number of regression analyses were performed. Although the effect sizes are fairly large, it will be important for the findings here to be replicated in separate research studies to reduce speculation concerning Type I error.

In summary, the present study demonstrated that while hope and expectancy were separate constructs, they were not unrelated. It should be noted that these data do not detract from previously established response expectancy effects in the literature, but rather suggest that pursuit of hope as a separate construct may increase our understanding of the source of response expectancies, as well as potentially add to predictive models of nonvolitional outcomes. However, the latter research issue is highly speculative as these relations have rarely been pursued in the literature. Additionally, both stable characteristics and prior experiences were associated with expectancies and hopes, and these relations appear to depend in part on the nature of outcomes (i.e. positive vs. negative valence). Future studies may need to use experimental research paradigms to test the sources of expectancy and hope, as well as to establish whether hope adds to predictive models of nonvolitional outcomes once expectancies have been incorporated.

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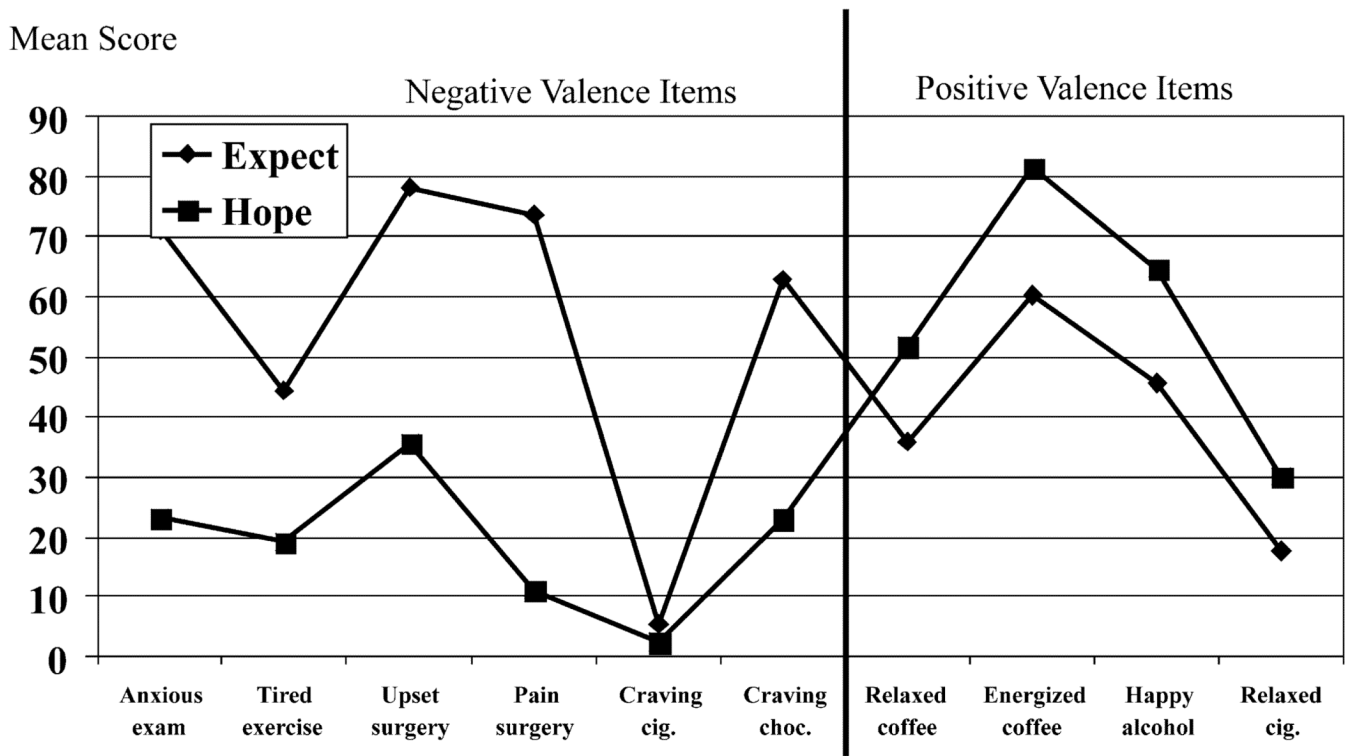


Fig. 1.
Mean hopes and expectancies by item.

Table 1Pearson correlations between expectancies and hopes by outcome ($N=73$ in all cases)

| Outcome | <i>r</i> | <i>P</i> < |
|-------------------------------|----------|------------|
| Anxiety about an exam | 0.31 | 0.01 |
| Tired following exercise | 0.36 | 0.01 |
| Upset about surgery | 0.35 | 0.01 |
| Pain following surgery | 0.08 | 0.53 |
| Craving a cigarette | 0.60 | 0.0001 |
| Craving chocolate | 0.42 | 0.001 |
| Relaxed following coffee | 0.49 | 0.0001 |
| Energized following coffee | 0.60 | 0.0001 |
| Happy following alcohol | 0.65 | 0.0001 |
| Relaxed following a cigarette | 0.59 | 0.0001 |

Table 2Correlations between past experience and expectancies and hopes for individual items ($N=73$ in all cases)

| Experience | Expectancies | | Hopes | |
|-------------------------------|--------------|------------|----------|------------|
| | <i>r</i> | <i>P</i> < | <i>r</i> | <i>P</i> < |
| Anxiety about an exam | -0.14 | 0.24 | -0.09 | 0.44 |
| Tired following exercise | -0.45 | 0.0001 | -0.07 | 0.56 |
| Craving a cigarette | 0.53 | 0.0001 | -0.03 | 0.83 |
| Craving chocolate | 0.28 | 0.02 | 0.24 | 0.04 |
| Relaxed following coffee | 0.23 | 0.05 | 0.22 | 0.06 |
| Energized following coffee | 0.16 | 0.17 | 0.18 | 0.11 |
| Happy following alcohol | 0.31 | 0.008 | 0.25 | 0.04 |
| Relaxed following a cigarette | 0.35 | 0.003 | 0.28 | 0.02 |