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Testing Models of the Experience of Self-Determination in Intrinsic Motivation and the Conundrum of Choice

Johnmarshall Reeve
University of Iowa

Glen Nix
Wachovia Corporation

Diane Hamm
Michigan State University

The authors investigated 3 commonly cited experiential qualities to propose a model of the essential nature of perceived self-determination in intrinsic motivation–internal locus, volition, and perceived choice. In 3 studies, they used structural equation modeling to compare a series of nested models in which 1, 2, or all 3 of these qualities were used to identify the best fitting conceptual model. Results consistently supported the model in which internal locus and volition, but not perceived choice, constitute valid indicators of self-determination. In light of the findings, the authors proposed a modified definition for perceived self-determination and discussed the conundrum of choice by proposing the conditions under which teachers can (and cannot) expect choice to increase students' intrinsic motivation.

Intrinsic motivation energizes important growth-fostering behaviors, such as seeking out challenges, exercising skills, and pursuing one's interests (Deci & Ryan, 1985b). It is a natural motivational force in all people that arises spontaneously out of the needs for self-determination and competence (Deci & Ryan, 1985b, 1991). As such, the rise and fall of intrinsic motivation occurs as environmental and interpersonal variables support and interfere with people's experiences of self-determination and competence. The present investigation focuses exclusively on self-determination, though we recognize fully the important contribution that the experience of perceived competence plays in intrinsic motivation (Deci & Ryan, 1985b; Harter, 1978; White, 1959).

The Research Problem

In the study of motivation, perceived self-determination is both an important and a controversial construct. In terms of its importance, self-determination relates not only to intrinsic motivation but also to other educationally important phenomena, such as optional functioning, personality integration, social development, internalization of extrinsic motivations, and personal well-being (Deci & Ryan, 1985b, 1987, 1991, 2000; Deci, Vallerand, Pelletier, & Ryan, 1991; Grolnick & Ryan, 1987; Ryan & Deci, 2000; Sheldon & Kasser, 1998; Vallerand, Fortier, & Guay, 1997). In terms of its controversy, self-determination has been difficult both to define theoretically (What is it?) and to assess psychometrically (How does one measure it?).

Theoretically, investigators have historically assessed only the direct effects environmental and interpersonal variables (e.g., rewards) have on intrinsic motivation. Further, investigators have assumed that perceptions of self-determination mediate between their manipulation and any observed change in intrinsic motivation. However, we need to test whether perceptions of self-determination actually mediate these direct effects. Although we found over 300 published studies that tested for a variable's effect on intrinsic motivation, only 16 of these studies actually assessed perceptions of self-determination (Boggiano, Flink, Shields, Seelbach, & Barrett, 1993; Deci, Eghrari, Patrick, & Leone, 1994; Eisenberger, Rhoades, & Cameron, 1999; Grolnick & Ryan, 1987; Guay, Vallerand, & Blanchard, 2000; McAuley, Duncan, & Tammen, 1989; Overskeid & Svartdal, 1996; Owens, Mortimer, & Finch, 1996; Reeve & Deci, 1996; Reeve & Sickenius, 1994; Ryan, 1982; Ryan, Koestner, & Deci, 1991; Ryan, Mims, & Koestner, 1983; Spreitzer, 1995; Spreitzer, Kizilos, & Nason, 1997; E. P. Thompson, Chaiken, & Hazelwood, 1993). Of these, only 3 tested perceived self-determination as a possible mediator (Eisenberger, Rhoades, & Cameron, 1999; Guay et al., 2000; Reeve & Deci, 1996). This lack of confirmation that perceived self-determination functions as a causal mediator leaves the empirical findings open to alternative interpretations as to why social and interpersonal factors affect intrinsic motivation (e.g., see the debate on rewards between Deci, Koestner, & Ryan, 1999, and Eisenberger, Pierce, & Cameron, 1999).

Psychometrically, investigators routinely use different measures to operationally define perceived self-determination. Further, these instruments often rely on a single item (Boggiano et al., 1993; Eisenberger, Rhoades, & Cameron, 1999; Overskeid & Svartdal,

Johnmarshall Reeve, Division of Psychological and Quantitative Foundations, University of Iowa; Glen Nix, Wachovia Corporation, Charlotte, North Carolina; Diane Hamm, Department of Educational Psychology, Michigan State University.

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Correspondence concerning this article should be addressed to Johnmarshall Reeve, Division of Psychological and Quantitative Foundations, 361 Lindquist Center, University of Iowa, Iowa City, Iowa 52242. E-mail: johnmarshall-reeve@uiowa.edu

1996) or only on a pair of items (Reeve & Deci, 1996; Thompson et al., 1993). Thus, researchers question the validity, internal consistency, and conceptual ambiguity these measures generate. This limits researchers' attempts to theoretically understand and operationally define self-determination as an ephemeral, situationally sensitive, and statelike experience (i.e., state self-determination). In contrast, efforts to assess perceived self-determination as an enduring characteristic in the personality (i.e., trait self-determination) have been deemed psychometrically sound. Highly reliable, valid, and educationally useful instruments to assess trait self-determination include the Academic Self-Regulation Questionnaire (Ryan & Connell, 1989), the Causality Orientations Scale (Deci & Ryan, 1985a), and the Academic Motivation Scale (Vallerand et al., 1992). Although personality measures lie outside the concern of the present investigation, they do nevertheless assess self-determination in a theoretically rich and psychometrically sound way.

Experience of Self-Determination

Here we provide an overview of how the experience of self-determination has been conceptualized. Early cognitive theories of motivation explained motivation via people's forward-looking intentions to approach positively valenced outcomes and to avoid negatively valenced ones. In doing so, these theorists adopted *intention*—a planned action—as their central motivational construct (Atkinson, 1964; Bandura, 1977; Heider, 1960; Lewin, 1951; Rotter, 1966; Vroom, 1964; Weiner, 1972). Within the empirical study of intrinsic motivation, researchers began to find that some intentional behaviors were initiated and regulated autonomously whereas others were initiated and regulated by coercive and pressuring environmental and intrapsychic forces (Deci & Ryan, 1985b, 1987). To differentiate autonomous intentions from controlled intentions, Deci (1980) adopted the term *self-determination* (in contrast to intentions that were other determined, reward determined, guilt determined, etc.).

The concept of self-determination integrated the prior decade of research on locus of causality (deCharms, 1968), psychological freedom (Rogers, 1969), and perceived choice (Deci, 1975). *Locus of causality* conveyed that intentional behavior could arise either from personal causation or from environmental causation (deCharms, 1968). With personal causation, the person was the "origin" of his or her behavior as action emerged from an internal perceived locus of causality; with environmental causation, the person was a "pawn" to environmental forces (e.g., surveillance) as action emerged from an external perceived locus of causality (deCharms, 1968). *Psychological freedom* conveyed the subjective experience people felt during behavior that emerged from fully autonomous (vs. controlled) intentions (Deci, 1980; Rogers, 1969). That is, when a person's intentional behavior was coordinated with his or her personal interests, preferences, and needs, then that person felt psychologically free during action. When intentional behavior reflected some outside agenda, the person felt psychologically forced into an action. In the context of these dichotomies (origin–pawn, free–forced), the concept of choice was then emphasized as the condition needed to induce the experiential shift "from pawn to origin" and "from forced to free" (Deci & Ryan, 1985b).

Autonomy is the concept that unites together these three experiential qualities. According to Deci and Ryan (1987), autonomy is a theoretical concept, and it connotes an inner endorsement of one's actions (origin, personal causation, internal locus), an experience during that action of high flexibility and low pressure (psychological freedom), and a sense that one's actions are truly chosen (perceived choice). In the present article, we used the term *self-determination* to refer to the subjective experience that reflects the underlying theoretical concept of autonomy. Given this historical perspective, we now summarize the research literature associated with each quality to introduce our research question that asks whether the experience of self-determination involves all, or only some, of these three qualities.

The most frequently portrayed quality of self-determination is *perceived locus of causality* (deCharms, 1968, 1976; Deci & Ryan, 1985b; Ryan & Grolnick, 1986). Perceived locus of causality exists within a bipolar continuum that extends from internal to external. This continuum reflects the individual's perception that his or her behavior is initiated and regulated by a personal (internal perceived locus of causality) or by an environmental (external perceived locus of causality) force. An internal locus reflects high self-determination—"that man is the origin of his behavior. He is a unique locus of causality" (deCharms, 1968, p. 272). An external locus reflects the perception that the causal source of one's behavior lies in an environmental force—that an individual's behavior has been energized, coerced, or seduced by desired environmental outcomes. To manipulate perceived locus of causality, researchers ask participants to engage in either an interesting task (to facilitate an internal locus) or that same task but with the promise of an extrinsic consequence, such as a reward (to facilitate an external locus; Lepper, Greene, & Nisbett, 1973). When extrinsic events decrease intrinsic motivation, the typical explanation offered is that the extrinsic event induced a more external locus (Deci et al., 1999; Deci & Ryan, 1985b; Pittman, Cooper, & Smith, 1977). To the extent that people experience self-determination as an internal locus, any condition that facilitates an internal (vs. external) perceived locus of causality should therefore increase both perceived self-determination and intrinsic motivation.

A second quality of self-determination is *volition*. In self-determination theory, volition is "a sense of unpressured willingness to engage in the activity" (Deci, Ryan, & Williams, 1996, p. 165). Volition centers on how free versus forced people feel while doing what they want to do (e.g., study, play) and how free versus forced people feel while refraining from what they do not want to do (e.g., apologize, smoke; Pervin, 1992; Ryan, 1982). Volition is high when actions are endorsed fully by the self such that the person experiences high freedom (Deci, 1980; Eisenberger, Rhoades, & Cameron, 1999, Study 2; Reeve & Deci, 1996) and little or no pressure (Deci & Ryan, 1987; Plant & Ryan, 1985; Ryan et al., 1991). In contrast to volition (i.e., high freedom, low pressure), people sometimes create within themselves a pressure-fueled motivation to force themselves into (or out of) action (Ryan, 1982; Ryan, Connell, & Grolnick, 1992; Ryan et al., 1991; Ryan et al., 1983; Ryan, Sheldon, Kasser, & Deci, 1996). Researchers refer to this internally generated tension as *ego-involvement*. It acts as an emotional marker that motivation is nonvolitional (Ryan et al., 1991). To the extent that people experience self-determination as volition, any condition that encourages feeling free (rather than

pressured) should therefore increase both perceived self-determination and intrinsic motivation.

A third quality of self-determination is *perceived choice*. Interpersonal environments sometimes afford individuals with decision-making flexibility and opportunities to choose among options. Other times, interpersonal environments obligate individuals toward a prescribed course of action. They communicate a rigidity in how to think, feel, and behave. Exposure to flexible interpersonal environments and opportunities to choose among options generally facilitates the perception of choice and, hence, self-determination and intrinsic motivation (Boggiano et al., 1993; Cordova & Lepper, 1996; Dwyer, 1995; Swann & Pittman, 1977; C. E. Thompson & Wankel, 1980; Williams, Grow, Freedman, Ryan, & Deci, 1996; Zuckerman, Porac, Lathin, Smith, & Deci, 1978). For instance, allowing people to choose which tasks to work on facilitates an intention to continue (C. E. Thompson & Wankel, 1980), autonomous functioning (Langer & Rodin, 1976; Owens et al., 1996; Williams et al., 1996), and intrinsic motivation (Dwyer, 1995; Zuckerman et al., 1978). To the extent that people experience self-determination as a perception of choice, any social condition that encourages perceived choice should therefore increase both perceived self-determination and intrinsic motivation.

In the literature, internal locus, volition, and perceived choice are identified as three qualities of self-determination. Our research question asked to what degree people experience these qualities as overlapping, or as independent, or even as epiphenomenal. This clarification could lead to an increased understanding of the essential nature of perceived self-determination. Such an accomplishment would have implications for both theory and classroom practice. Current theoretical statements treat these qualities as overlapping and mutually supportive (Deci & Ryan, 1985b). Consider, however, two possible counterexamples. First, a student might experience high perceived choice yet little volition if all options were unappealing (e.g., when choosing among several unappealing books on a reading list). Second, a student might engage a task with an internal perceived locus of causality, yet be highly ego-involved (e.g., a senior striving to become valedictorian to prove personal worth). These examples suggest the possibility that internal locus, volition, and perceived choice can, at least under some conditions, operate in somewhat independent ways. If so, one can ask whether one or two of these qualities represent the core experience of self-determination whereas others exist only as correlated epiphenomena of that experiential core (Deci, 1987). Thus, we considered it an empirical question to ask to what degree internal locus, volition, and perceived choice are more or less central to the coherent experience of self-determination in intrinsic motivation.

To answer our research question, we conducted three studies. In each study, our empirical strategy was to expose participants to conditions previously validated as capable of affecting their perceptions of self-determination. We then measured how these conditions affected each hypothesized quality. Next, we analyzed how each quality in turn affected intrinsic motivation. If internal locus, volition, and perceived choice each exist as a contributing quality to the coherent experience of self-determination, then each quality should (a) be sensitive to conditions known to affect self-determination and (b) predict intrinsic motivational outcomes, even after controlling for the variance in intrinsic motivation accounted for by the other two qualities.

Seven Possible Conceptual Models of Self-Determination

Considering all possible combinations of these three qualities of self-determination, we constructed seven conceptual models with the goal of identifying which were valid and which were unsupportable. In each model, we defined self-determination by how many qualities—one, two, or three—we used to represent it as a latent construct. In constructing each model, we conceptualized perceived self-determination as a psychological mediator to explain how environmental and interpersonal variables affect intrinsic motivational outcomes. We borrowed Vallerand's (1997) motivational mediation model to construct each model: external condition → perceived self-determination → intrinsic motivational outcome. In each model, our basic assumption was that external conditions affected changes in perceived self-determination and that changes in perceived self-determination, in turn, affected intrinsic motivational outcomes.

Models 1–7 represent a series of hierarchical, or nested, conceptual models. The only change from one model to the next was how we conceptualized the construct of perceived self-determination. In Model 1, perceived self-determination consisted only of the observed variable of internal locus. In Model 2, perceived self-determination consisted only of the observed variable of volition. In Model 3, perceived self-determination consisted only of the observed variable of perceived choice. In Model 4, perceived self-determination (PSD) was a latent construct indicated by the two observed qualities of internal locus (IL) and volition (V) (PSD → IL, V). In Model 5, perceived self-determination was a latent construct indicated by the two observed qualities of internal locus and perceived choice (PC) (PSD → IL, PC). In Model 6, perceived self-determination was a latent construct indicated by the two observed qualities of volition and perceived choice (PSD → V, PC). In Model 7, perceived self-determination was a latent construct indicated by all three observed qualities (PSD → IL, V, PC).

In testing these nested models, we began with Model 7 and systematically eliminated individual indicators to test whether the nested, more restricted model fit the data better. We focused our attention primarily on comparing the multiple-quality models (Models 4–7). A self-determination theorist would not argue that perceived self-determination consists of only one single quality, but we included those models nonetheless because any valid multiple-quality model needs to account for a significantly greater proportion of the variance in intrinsic motivation than does any single-quality model nested within that multiple-quality model.

In Study 1, the external variable we used to affect level of perceived self-determination was exposure to an autonomy-supportive or controlling teacher. In Studies 2 and 3, the external variable was the provision of choice versus task assignment (Study 2) or exposure or not to a series of ongoing choices about what to do (*action choices*; Study 3). Across all three studies, we used the same questionnaires to assess internal locus, volition, and perceived choice. Finally, we assessed intrinsic motivation either with a self-report interest–enjoyment measure (Study 1) or with a composite measure that combined this self-report measure with a behavioral free-choice persistence measure (Studies 2 and 3).

Study 1: Autonomy-Supportive Motivating Style

The purpose of Study 1 was to expose participants to an external condition capable of inducing in them an experience of high versus low perceived self-determination. We accomplished this by borrowing from Reeve, Bolt, and Cai's (1999) procedure in which participants are asked to learn how to solve a series of interesting puzzles from a tutor who adopted either a relatively autonomy-supportive or a controlling motivating style. This quasi-experimental methodology provided a range of teachers who varied in how autonomy supportive versus controlling they were. Thus, in Study 1, the tutor's interpersonal motivating style was treated as an emergent variable capable of affecting participants' self-determination. This variable was coded by raters to place each tutor–teacher on a continuum from highly controlling to highly autonomy supportive (for similar studies, see Black & Deci, 2000; deCharms, 1976; Williams et al., 1996). To provide our raters with criteria to determine each teacher's motivating style, we assessed nine conversational and interpersonal behaviors that previous work had validated as autonomy-supportive or controlling ways of motivating another (Deci, Spiegal, Ryan, Koestner, & Kauffman, 1982; Flink, Boggiano, & Barrett, 1990; Reeve et al., 1999).

Method

Participants

The participants were 60 pairs of same-gender undergraduate students (52 female pairs and 8 male pairs) enrolled in the teacher certification program at a large, urban Midwestern university. Each participant was a junior, senior, or postbaccalaureate preservice teacher in the School of Education with at least observational experience in the local school district. Each participant received extra course credit for his or her participation.

Procedure

We ran participants in pairs. Upon arrival at the laboratory, participants were randomly assigned into the role of either teacher or student. During the first 10 min, the student waited in another room while the investigator introduced the teacher to an interesting puzzle called Happy Cubes (from Reeve, 1989). The teacher was given 10 min to gain familiarity with the puzzle and to develop a teaching strategy. After this 10-min session, the investigator left the room to get the student and introduced him or her to the teacher and to the puzzle. The investigator said that the student's task was "to try to learn how the puzzle worked and to solve as many solutions as possible." The teacher's task was "to assist the student in learning about the puzzle and its solutions in whatever way you see fit." The pair sat side-by-side at a large table with the puzzle and seven solution replicas that were scaled to size. Following these instructions, the investigator left for an adjacent room. The instructional episode lasted 10 min and was videotaped (with participants' awareness and consent). Following the instructional session, the investigator returned to administer a postsession questionnaire to measure the student's self-determination and intrinsic motivation (the teacher completed a different questionnaire). The investigator then debriefed the pair, asked permission to use their videotaped data, and allowed anyone who expressed an interest to watch the videotaped interaction.

Measures

We collected three sets of measures. The first set assessed the teacher's style as relatively autonomy supportive or not. The second set assessed the student's perceptions of self-determination. The third set assessed the student's intrinsic motivation toward the puzzle.

Teacher's autonomy-supportive behavior. An earlier study using this same methodology validated seven behaviors and two subjective impressions of the teacher as autonomy supportive (see Table 1, p. 543, in Reeve et al., 1999; see also Deci et al., 1982; Flink et al., 1990). The seven behaviors were as follows: (a) listened, (b) held instructional materials (reverse scored), (c) spoke directives (reverse scored), (d) asked questions about what the student wanted, (e) was responsive to student-initiated questions, (f) gave solutions (reverse scored), and (g) offered perspective-taking statements; the two subjective impressions were (a) supported intrinsic motivation and (b) supported internalization (for operational definitions, see Reeve et al., 1999, p. 541). Two trained raters independently viewed the videotaped sessions to score the seven instructional behaviors and two impressions of the teacher's style. One rater scored all 60 videotapes, while the second rater scored a random sample of 20 (i.e., one third) of these videotapes to estimate interrater reliabilities. Interrater reliabilities were above .60 for all nine ratings. We used a single overall score to characterize motivating style (instead of examining the individual effects of each teaching behavior) because Deci and his colleagues (1994) showed that autonomy-supportive behaviors work collectively in ways that facilitate one another to foster a gestalt impression of the interaction partner's motivating style. To compute an overall score, each of these nine measures was first standardized (using *z* scores) and then coded so that high scores reflected a relatively autonomy-supportive style; the nine scores were then averaged into a single score, called *autonomy-supportive motivating style* ($\alpha = .83$).

Student's self-determination. We measured three qualities of perceived self-determination: perceived locus of causality, volition, and perceived choice. Because unidimensional measurement of each quality was a critical priority, we used only three well-chosen items per scale. According to Judd, Jessor, and Donovan (1986), using only a few items per scale maximizes the chance for unidimensional measurement and minimizes the chance that multiple constructs will emerge. The nine items used—three per scale—appear in Table 1. For each item we used a 1–7 response scale (*not at all true* to *very much true*). Five items were borrowed from two previously validated questionnaires (Intrinsic Motivation Inventory, Ryan, 1982; Activity-Feelings States Scale, Reeve & Sickenius, 1994), and the remaining four items were written (after extensive pilot testing) specifically for the present investigation. We needed to create these new items—particularly for perceived locus of causality and volition—because previous scales for these constructs simply did not exist. What did exist (instead of psychometrically sound scales) were individual items used from one study to the next. For instance, one study used "I felt like I was doing what I wanted to while I was working on the brainstorming task" to assess what we believed to be an internal perceived locus of causality (E. P. Thompson et al., 1993, p. 993), whereas another study used "I have freedom to adopt my own approach to the job" to assess what we believed to be volition (Eisenberger, Rhoades, & Cameron, 1999, p. 1032). In creating the new items, we used only the precise term or experience that the authors reviewed in the introduction used in their writings about self-determination. In the construction of the questionnaire, we added filler items to disguise its purpose and to assess related constructs (e.g., perceived competence). The number of items and the internal consistency for each scale were as follows: perceived locus of causality, three items ($\alpha = .83$); volition, three items ($\alpha = .81$); and perceived choice, three items ($\alpha = .85$).

Student's intrinsic motivation. We operationally defined intrinsic motivation as participants' self-reported level of interest in and enjoyment of the puzzle. We used a previously validated measure (Reeve, 1989) with three items to assess interest (e.g., "The puzzle is very interesting") and three items to assess enjoyment (e.g., "The puzzle is fun"). This six-item measure used a 1–7 unipolar response scale (*not at all true* to *very much true*) and was internally consistent ($\alpha = .93$). Typically, researchers in laboratory settings have measured intrinsic motivation with both a self-report and a behavioral measure (for a discussion of these measures, see

Table 1
Questionnaire Items to Assess Perceived Locus of Causality, Volition, and Perceived Choice

Variable	Items
Perceived locus of causality	I felt I was doing only what the teacher wanted me to do. (R)[a]
	I felt I was doing what I wanted to be doing.[a]
	I felt I was pursuing goals that were my own.[a]
Volition	While puzzle-solving, I felt a relaxed sense of personal freedom.[a]
	During the puzzle-solving, I felt free.[b]
	During the puzzle-solving, I felt pressured. (R)[b]
Perceived choice	I believe I had a choice over which solution to try to solve.[c]
	I felt like it was my own choice as to which puzzle to solve.[c]
	I felt that I had control to decide which puzzle to solve.[c]

Note. Items marked (R) were reverse-scored.
[a] Item created for the purposes of the present investigation. [b] Item borrowed from the Activity–Feeling States Scale (Reeve & Sickenius, 1994). [c] Item borrowed from the Intrinsic Motivation Inventory (Ryan, 1982).

Deci et al., 1999, pp. 635–636). The two measures correlate about .40 across different studies (Harackiewicz, 1979; Harackiewicz, Manderlink, & Sansone, 1984; Reeve & Nix, 1997), and they correlate about .66 under unconfounded (i.e., task involvement) conditions (see Ryan et al.'s [1991] Table 4, p. 201). Citing this association with the behavioral measure, several studies successfully used only the self-report measure of intrinsic motivation (Anderson & Rodin, 1989; Harackiewicz, 1979; Sansone, 1989; Vallerand, 1983). Although the logistics of our Study 1 limited us to using only the self-report measure, we nevertheless chose to add the behavioral measure in Studies 2 and 3.

Data Analysis

To conduct our main analysis, we first organized the scores from the three scales (listed in Table 1) into the seven a priori conceptual models so that we could conduct a series of structural equation modeling analyses (using LISREL 8; Jöreskog & Sörbom, 1993). To evaluate each model's fit of the observed data, we relied on the chi-square statistic and two indices of fit, the root-mean-square residual (RMR) and the comparative fit index (CFI). A nonsignificant chi-square serves as the basic test of whether a model adequately describes the data (Bollen & Long, 1993), and a supplement to this test is to examine the chi-square to degrees-of-freedom ratio, in which a ratio less than 2 indicates a good fit (Carmines & McIver, 1981; Newcomb, 1990). We included two fit indices because fit indices often provide a better indicator of model fit than do these chi-square statistics (Bentler & Bonett, 1980). We used the RMR as an absolute fit index and the CFI as an incremental fit index (Bentler, 1990). RMR is a summary statistic for the residuals, so the lower the number is, the better the model fits (i.e., less than .05, down to a possible low of 0; Hu & Bentler, 1999). CFI compares the lack of fit of the target model with the independence model, so the higher the number is, the better the model fits (i.e., greater than .95, up to a possible high of 1; Hu & Bentler, 1999). Thus, to provide the information necessary to evaluate each conceptual model's fit, we present four statistics: the chi-square, the chi-square to degrees-of-freedom ratio, and two fit indices (RMR and CFI). Last, we report the proportion of variance accounted for (R^2) in each model's prediction of intrinsic motivation. This R^2 value reveals how relevant each conceptual model's portrayal of self-determination was to intrinsic motivation.

To compare one model against another, we tested a series of nested models (Bentler, 1990). Any two models are nested to the extent that the set of parameters estimated in the more restrictive model is a subset of the set of parameters estimated in the less restrictive model (e.g., Model 6 is a more restricted subset of Model 7). The difference in chi-squares between two nested models can be tested statistically, and this test of statistical significance provides information whether or not one model fits the data significantly better than does the other.

Results

The descriptive statistics and intercorrelations among the study's five observed variables appear in Table 2. The teacher's autonomy-supportive motivating style correlated significantly with the students' experiences of internal locus ($r = .28$, $p < .05$) and perceived choice ($r = .45$, $p < .05$) and correlated marginally with volition ($r = .24$, $p < .07$). Each hypothesized quality intercorrelated with the other two qualities (rs ranged from .41 to .51, ps $< .05$), and each quality correlated significantly with the measure of intrinsic motivation (rs ranged from .27 to .54, ps $< .05$).

Table 2
Study 1: Descriptive Statistics and Correlation Matrix for Motivating Style, Three Qualities of Self-Determination, and Intrinsic Motivation

Variable	*M*	*SD*	Range	1	2	3	4	5
1. Autonomy-supportive motivating style	0.00	0.65	−1.6 to 1.6	—	.28*	.24†	.45**	.17
2. Internal locus	4.92	1.41	1.0 to 7.0		—	.48**	.51**	.54**
3. Volition	4.13	1.41	1.0 to 7.0			—	.41**	.54**
4. Perceived choice	4.91	1.88	1.7 to 7.0				—	.27*
5. Intrinsic motivation	5.79	1.31	1.0 to 7.0					—

Note. $N = 60$.
† $p < .07$ (marginally significant), two-tailed. * $p < .05$, two-tailed. ** $p < .01$, two-tailed.

Values for the set of statistics used to evaluate the adequacy of each conceptual model appear in Table 3. Considered in isolation, four models fit the data well (Models 1, 2, 3, and 4), on the basis of the criteria of a nonsignificant χ^2, χ^2/df ratio < 2, RMR $< .05$, CFI $> .95$, and $p < .05$ for the proportion of variance in intrinsic motivation (R^2[IM]) explained by the model.

To begin the nested model approach, we found that Model 7 (PSD → IL, V, PC) provided a relatively poor fit to the data: $\chi^2(5, N = 60) = 11.90$, $p < .05$, χ^2/df ratio = 2.38, RMR = .08, CFI = .90, and R^2(IM) = .43, $p < .01$. We next tested the series of three two-quality nested models to see whether a simpler two-quality conceptualization of perceived self-determination could provide a better fit to the observed data than did Model 7. Only Model 4 fit the data significantly better than did Model 7: Model 4 (PSD → IL, V), $\Delta\chi^2(3, N = 60) = 10.59$, $p < .05$; Model 5 (PSD → IL, PC), $\Delta\chi^2(3, N = 60) = 4.48$, *ns*; and Model 6 (PSD → V, PC), $\Delta\chi^2(3, N = 60) = 3.78$, *ns*. These results show that Model 4 fit the data significantly better than did Model 7. To continue the nested model approach, we tested whether either single-quality conceptual model nested within Model 4 fit the data significantly better than did Model 4. Neither did: Model 1 (PSD → IL), $\Delta\chi^2(1, N = 60) = 1.28$, *ns*; Model 2 (PSD → V), $\Delta\chi^2(1, N = 60) = 1.17$, *ns*. These results suggest that (a) Model 4 fit the data overall very well and (b) no simpler conceptual model of perceived self-determination provided a better fit. The path diagram showing the fully standardized parameter estimates for Model 4 appears in Figure 1.

Discussion

The correlational results from Study 1 showed that all three qualities of perceived self-determination correlated with the autonomy-supportive condition, with one another, and with the measure of intrinsic motivation (see Table 2). The nested models results revealed that the best fitting conceptual model of perceived self-determination included internal locus and volition but excluded perceived choice (i.e., Model 4). Model 4 explained an impressive 57% of the variance in participants' intrinsic motivation (see Table 3). The reason the models that included perceived choice (Models 5, 6, and 7) fit the data relatively poorly was that including perceived choice as an indicator of perceived self-determination created a latent construct that was noticeably less related to intrinsic motivation than was Model 4 (see the R^2[IM] column in Table 3).

The findings from Study 1 imply that internal locus and volition constitute the core experience of perceived self-determination in intrinsic motivation. Such a conclusion is necessarily limited to the teacher–student paradigm we used. So, in considering a design for Study 2, we relied on the most frequently used paradigm in this research tradition to generate an experience of high versus low perceived self-determination (described below). By doing so, we gained the advantage of adding a behavioral measure of intrinsic motivation. A second concern that limits the conclusions we can draw from Study 1 was the relatively small sample size. Conventional wisdom recommends that LISREL-generated statistical claims "be modest" when sample size is less than 100 (Loehlin, 1992, p. 60). In our defense, however, our sample size was of a medium, rather than a small, size, because sample size adequacy is less an absolute number than it is a ratio between sample size and the number of observed variables. According to Bentler and Yuan's (1998) formula ($N > p^*$), a data set with five observed variables (p) and 60 cases (N) is of a medium size. Nonetheless, because conventional wisdom recommends a sample size exceed 100 for LISREL-generated claims, we tripled our sample size in Study 2.

In selecting a research methodology for Study 2, we reviewed how researchers manipulated perceptions of self-determination in the past. The most common means of doing so has been to pair the activity with an external event (e.g., reward, deadline) to decrease perceived self-determination (see Deci et al.'s [1999] meta-analysis of over 100 of these studies) and, hence, intrinsic motivation. However, we wanted an experimental design capable of increasing or decreasing perceived self-determination. Study 1 allowed us this possibility by featuring teachers who were autonomy supportive (and hence capable of increasing students' self-determination) or controlling (and hence capable of decreasing students' self-determination). A second research methodology with the capacity to increase or decrease perceptions of self-determination is to provide a manipulation of either a provision for choice to increase self-determination or a task assignment to decrease it (Cordova & Lepper, 1996; Dwyer, 1995; Zuckerman et al., 1978). In our Study 2, we followed this research tradition and used the provision

Table 3
Study 1: LISREL Results for Each of the Seven Conceptual Models of Self-Determination

Model	χ^2	*df*	*p*	χ^2/df	RMR	CFI	R^2(IM)
1. PSD → IL only	0.03	1	*ns*	0.03	.01	1.00	.29
2. PSD → V only	0.14	1	*ns*	0.14	.02	1.00	.29
3. PSD → PC only	0.19	1	*ns*	0.19	.02	1.00	.07
4. PSD → IL, V	1.31	2	*ns*	0.66	.03	1.00	.57
5. PSD → IL, PC	7.42	2	.03	3.71	.08	.88	.36
6. PSD → V, PC	8.12	2	.02	4.06	.09	.84	.40
7. PSD → IL, V, PC	11.90	5	.04	2.38	.08	.90	.43

Note. $N = 60$. RMR = root-mean-square residual; CFI = comparative fit index; R^2(IM) = proportion of variance in intrinsic motivation explained by the model; PSD = perceived self-determination (as a latent construct); → = consists of the following qualities; IL = internal locus (as an indicator of the latent construct of PSD); V = volition (as an indicator); PC = perceived choice (as an indicator).

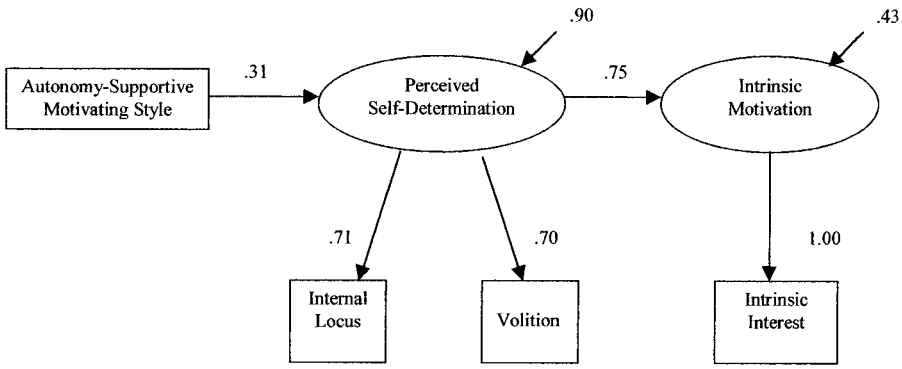

Figure 1. Study 1: Standardized parameter estimates for Model 4 (perceived self-determination → internal locus, volition). Solid lines indicate significant standardized path coefficients ($p < .01$).

for choice (vs. task assignment) to manipulate high versus low perceived self-determination.

Study 2: Provision for Choice

The purpose of Study 2 was to manipulate explicitly participants' perceptions of choice (the elusive experience in Study 1) to see how its systematically induced rise and fall might refine our conclusion from Study 1, namely that the core experience of self-determination includes internal locus and volition but excludes perceived choice. To design Study 2, we borrowed Zuckerman and his colleagues' (1978) experimental "yoking procedure." In their experiment, participants afforded a choice among options showed higher intrinsic motivation (and presumably higher self-determination, though these researchers did not actually measure perceived self-determination) than did participants simply assigned to do the same activity. The yoking procedure ensures that participants in both the choice and assignment conditions engage in the same task for the same duration of time. To strengthen their procedure, we added a control group, because we wanted to isolate whether the provision for choice increased self-determination, whether task assignment decreased it, or whether both effects occurred.

Method

Participants

Participants were 198 undergraduate students from an introductory psychology course at a large Northeastern university who received extra course credit for their participation. Twelve participants unexpectedly solved either the practice or the actual puzzle; we deleted these participants from our analyses because we did not want the added mastery experience to confound either self-determination or intrinsic motivation (e.g., see Boggiano & Ruble, 1979). The final sample therefore consisted of 186 students (132 females and 54 males) organized into yoked, same-gender triads.

Procedure

We randomly assigned participants into one of three experimental conditions and ran participants one at a time. Participants in the choice and assignment groups were seated at a large, rectangular table that held six solution drawings of the SOMA puzzle (the same task used in Zuckerman et al., 1978). The experimenter said that the purpose of the study was to investigate puzzle-solving concepts and that the participant would be solving some puzzle problems. The experimenter directed the participant to a sample puzzle and allowed him or her to work on it for 2 min to gain familiarity with SOMA. Following the warm-up, the experimenter said that the participant was to work 10 min on the main SOMA problem. Pilot testing showed that 10 min was sufficient to allow an expectation of solving the SOMA yet insufficient to actually solve it.

In the *choice* condition, the experimenter asked the participant to take a moment to look over the six alternatives and then select the one he or she most wanted to work with during the 10-min session. In the *assignment* condition, the experimenter assigned the participant to work on one particular puzzle. Here, the experimenter asked the participant to take a moment to look over the six alternatives and then assigned the participant to work on a prescheduled solution, which was the same one chosen earlier by the "yoked" choice-condition participant. Once a puzzle was chosen or was assigned, the experimenter removed the other five SOMA options from the table. For participants in the control group, only one puzzle problem lay on the tabletop throughout the session, and it was the same puzzle chosen in the choice condition and assigned in the assignment condition.

Following this experimental manipulation, the experimenter treated participants in all three conditions the same. After the 10 min of puzzle solving, the experimenter administered a postexperimental questionnaire to assess the qualities of self-determination and self-report measure of intrinsic motivation (along with a number of filler items). Once the questionnaire was collected, the experimenter announced that the experiment had come to its conclusion, except that he or she needed to leave the room to collect some additional materials needed for the debriefing. The experimenter told the participant that his or her absence would last 5 to 10 min and that the participant in the meantime may do whatever he or she wanted. In actuality, the experimenter observed and recorded the time the participant played with the puzzle and distractor activities (i.e., popular, current magazines). The number of seconds the participant played with the SOMA while alone served as the behavioral measure of intrinsic motivation (possible range, 0 to 480 s).

Measures

We used the same postexperimental questionnaire from Study 1 to assess participants' self-reports of internal locus, volition, perceived choice, and interest–enjoyment. Internal consistencies were again reasonably high for all four measures: internal locus, three items ($\alpha = .71$); volition, three items ($\alpha = .60$); perceived choice, three items ($\alpha = .96$); and interest–enjoyment, six items ($\alpha = .89$). To construct a single, coherent measure of

intrinsic motivation, we combined the self-report and behavioral measures ($r = .42$, $p < .01$) by first standardizing each measure and then averaging the two *z* scores into a single composite measure.

Results

The descriptive statistics and intercorrelations among the study's five dependent variables appear in Table 4. We coded the choice manipulation as −1 (assignment), 0 (control), and 1 (choice) and found that it significantly affected only perceived choice, $F(2, 183) = 195.31$, $p < .01$ (*M*s = 2.19, 2.18, and 6.27, respectively). The choice manipulation did not significantly affect internal locus, $F(2, 183) = 2.07$, *ns*; volition, $F(2, 183) = 1.59$, *ns*; or intrinsic motivation ($F < 1$). Among the hypothesized qualities of perceived self-determination, internal locus correlated significantly with both perceived choice ($r = .16$, $p < .05$) and volition ($r = .41$, $p < .05$), but perceived choice and volition did not intercorrelate significantly ($r = .05$, *ns*). As to intrinsic motivation, internal locus ($r = .52$, $p < .05$) and volition ($r = .31$, $p < .05$), but not perceived choice ($r = .07$, *ns*), correlated significantly with the measure of intrinsic motivation.

To compare the series of nested conceptual models, we again used LISREL analyses. We relied on the same five statistics used in Study 1 to evaluate the adequacy of each conceptual model's fit of the observed data. Values for these statistics appear in Table 5. Considered in isolation, four models fit the data well (Models 1, 2, 3, and 4), on the basis of the criteria of a nonsignificant χ^2, χ^2/df ratio < 2, RMR < .05, CFI > .95, and $p < .05$ for R^2(IM).

To begin the nested models analysis, we tested whether Model 7 fit the data well, but it did not: $\chi^2(5, N = 186) = 142.92$, $p < .01$, χ^2/df ratio = 28.58, RMR = .19, CFI = .41, and R^2(IM) = .38, $p < .01$. All three two-quality models fit the data significantly better than did Model 7: Model 4, $\Delta\chi^2(3, N = 186) = 142.37$, $p < .01$; Model 5, $\Delta\chi^2(3, N = 186) = 83.44$, $p < .01$; and Model 6, $\Delta\chi^2(3, N = 186) = 104.41$, $p < .01$. Thus, we rejected the three-quality conceptualization (Model 7) in favor of the series of two-quality conceptualizations (Models 4, 5, and 6). Among these two-quality conceptual models, only Model 4 (PSD → IL, V) actually fit the data well: $\chi^2(2, N = 186) = 0.55$, *ns*, χ^2/df ratio = 0.28, RMR = .01, CFI = 1.00, R^2(IM) = .39. Both Models 5 and 6 fit the data poorly (i.e., χ^2/df ratios > 10). Although it is not possible to directly compare Models 4–6 (because they are not nested and because they have the same number of degrees of freedom), it is nonetheless clear that neither Model 5 nor Model 6 accounted for any meaningful variance in intrinsic motivation, R^2(IM) = .00. Before accepting Model 4 (PSD → IL, V), we tested its two nested models to see whether either simpler conceptualization would provide a better fit to the data. Neither did: Model 1 (PSD → IL), $\Delta\chi^2(1, N = 186) = 0.54$, *ns*, and Model 2 (PSD → V), $\Delta\chi^2(1, N = 186) = 0.41$, *ns*. These results suggest that (a) Model 4 fit the data overall very well and (b) no simpler conceptual model of perceived self-determination provided a better fit. The path diagram showing the fully standardized parameter estimates for Model 4 appears in Figure 2.

Discussion

The results from Study 2 showed that Model 4 (PSD → IL, V) allowed for the construction of a conceptualization of perceived self-determination that fit the observed data well. Model 4 explained 39% of the variance in participants' intrinsic motivation (see Table 5). As was the case in Study 1, Models 5 (PSD → IL, PC) and 6 (PSD → V, PC), which included perceived choice, fit the data poorly because including perceived choice as an indicator of perceived self-determination functionally created a latent construct that was noticeably less related to intrinsic motivation than was Model 4 (see the R^2(IM) column in Table 5). Model 7 (PSD → IL, V, PC) did nonetheless successfully explain 38% of the variance in intrinsic motivation. Because Model 7 explained intrinsic motivation almost as well as Model 4 and because Model 7 fit the data so much more poorly than did Model 4, the findings suggest the possibility that internal locus and volition underlie one coherent experience (one that is related to intrinsic motivation) whereas perceived choice might underlie a second coherent experience (one that is not related to intrinsic motivation). We explored this possibility further in Study 3.

Surprisingly, our choice manipulation failed to influence internal locus, volition, or intrinsic motivation. These nonsignificant effects suggest that the provision for choice as operationally defined in Study 2 does not necessarily facilitate intrinsic motivational processes. The provision for choice clearly and strongly affected participants' perception of choice, but neither the environmental provision for choice nor the subjective experience of perceived choice correlated in a meaningful way with internal locus, volition, and intrinsic motivation (see Table 4).

Why did the provision for choice have little to do with the experiences of either self-determination or intrinsic motivation? We reexamined past studies that manipulated choice to explain why, in other studies, choice increased intrinsic motivation. To

Table 4
Study 2: Descriptive Statistics and Correlation Matrix for Provision for Choice, Three Qualities of Self-Determination, and Intrinsic Motivation

Variable	*M*	*SD*	Range	1	2	3	4	5
1. Code for choice vs. assignment	0.00	0.85	−1.0 to 1.0	—	.05	−.02	.73**	.02
2. Internal locus	4.32	1.32	1.0 to 7.0		—	.41**	.16*	.52**
3. Volition	3.93	1.28	1.3 to 7.0			—	.05	.31**
4. Perceived choice	3.72	2.40	1.0 to 7.0				—	.07
5. Intrinsic motivation	0.00	0.84	−2.4 to 1.2					—

Note. $N = 186$.
* $p < .05$, two-tailed. ** $p < .01$, two-tailed.

Table 5
Study 2: LISREL Results for Each of the Seven Conceptual Models of Self-Determination

Model	χ^2	*df*	*p*	χ^2/df	RMR	CFI	R^2(IM)
1. PSD → IL only	0.01	1	*ns*	0.01	.00	1.00	.27
2. PSD → V only	0.14	1	*ns*	0.14	.01	1.00	.10
3. PSD → PC only	0.39	1	*ns*	0.39	.01	1.00	.00
4. PSD → IL, V	0.55	2	*ns*	0.28	.01	1.00	.39
5. PSD → IL, PC	59.48	2	<.01	29.74	.16	.71	.00
6. PSD → V, PC	38.51	2	<.01	19.26	.14	.77	.00
7. PSD → IL, V, PC	142.92	5	<.01	28.58	.19	.41	.38

Note. $N = 186$. RMR = root-mean-square residual; CFI = comparative fit index; R^2(IM) = proportion of variance in intrinsic motivation explained by the model; PSD = perceived self-determination (as a latent construct); → = consists of the following qualities; IL = internal locus (as an indicator of the latent construct of PSD); V = volition (as an indicator); PC = perceived choice (as an indicator).

manipulate choice, Zuckerman et al. (1978) allowed choice-endowed participants to make an initial choice among options (as we did). However, they further allowed participants to exercise an ongoing series of choices about how to appropriate their time—whether to persevere or to switch to another puzzle, whether to pause for a break, or whether to return to a previously engaged puzzle. In contrast, we intentionally used a modified choice manipulation. We modified Zuckerman et al.'s operational definition of the provision for choice (i.e., we provided participants with only a single, initial choice from among an array of six options) because we suspected that an ongoing opportunity to exercise choice over how to appropriate one's time would create an experimental manipulation of not only choice (which puzzle to solve) but also internal locus (do what you want to do) and volition (feel free to persist or quit). So, we suspect the reason Zuckerman et al.'s manipulation increased intrinsic motivation was that it was designed (intentionally) to affect not only participants' perceived choice but also their internal locus and volition. In contrast, our manipulation did not increase intrinsic motivation because it was designed (intentionally) to affect only the perception of choice.

Study 3: Action Choices and Option Choices

Now that choice seems to be problematic, the purpose of Study 3 was to test whether all choices are the same in terms of their effect on intrinsic motivation (see also Flowerday & Schraw, 2000; Iyengar & Lepper, 2000). Evidently, some choices (e.g., those provided by Zuckerman et al., 1978) tap into and involve perceived self-determination and intrinsic motivation, whereas other choices do not (e.g., our Study 2). A choice among mandated options (e.g., "Do you want to listen to country music or to classical music?") takes action for granted and therefore may be less relevant to the experiences of internal locus (e.g., "Do you even want to listen to music?") and volition (e.g., "Do you feel pressured to listen to the music I'm asking you to listen to?"). Option choices (pick Option A or Option B) can evidently generate an experience of perceived choice that bypasses experiences of internal locus, volition, and intrinsic motivation. Our interpretations that (a) types of choices exist and (b) some choices affect self-determination whereas others may not are supported in the recent literature. Using a procedure similar to our Study 2, Schraw, Flowerday, and Reisetter (1998) provided college students with a choice of three stories to read or assigned them one. Choice did little to increase interest (see their Study 1). Similarly, Overskeid and Svartdal (1996) used a choice versus assignment manipulation involving an uninteresting puzzle and found that choice did not increase interest. In contrast, using a procedure similar to Zuckerman et al.'s iterative decision making in regulating their ongoing behavior, Cordova and Lepper (1996) provided elementary-grade students with a series of ongoing choices as they engaged in a

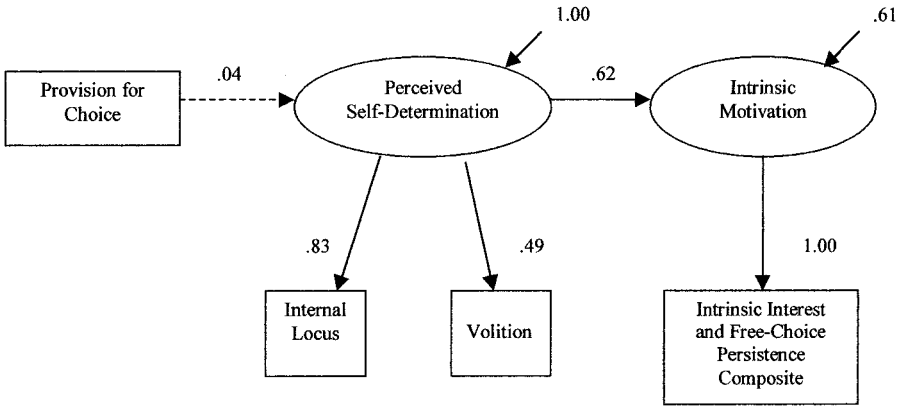

Figure 2. Study 2: Standardized parameter estimates for Model 4 (perceived self-determination → internal locus, volition). Solid lines indicate significant standardized path coefficients ($p < .01$). Dashed line indicates nonsignificant path.

computer game. This included not only choices among options but also choices in their work methods, pace, and effort (see also Thomas & Oldfather, 1997). Presented in this way, choice enhanced intrinsic motivation.

In our Study 3, we provided participants with one of three conditions: a series of action choices; a series of option choices; or a series of assignments (a control group). In doing so, we hypothesized that types of choices exist and that only action choices would affect participants' self-determination and intrinsic motivation. We also continued to test our series of nested models to gain additional data to determine the essential nature of the subjective experience of self-determination in intrinsic motivation.

Method

Participants

Participants were 75 undergraduate students (55 females and 20 males) from an educational psychology course at a large Midwestern university who received extra course credit for their participation. For reasons explained below, the final sample actually consisted of only 66 of these students (48 females and 18 males). To obtain a sample of 22 precisely matched triads, we created a complex yoking procedure that required us to keep a running surplus of 10–12 participants in the action choices condition. At the conclusion of our study, 9 (surplus) participants were not yoked to participants in the other two conditions. We therefore did not include their data in the analyses. At the conclusion of the study, we compared the data from these 9 excluded surplus participants with the data from the 22 included yoked participants in the action choices condition and found that the two groups did not differ on any of our five dependent measures ($ts < 1$).

Procedure

We ran participants one at a time. Each participant sat at a large, rectangular table that held a SOMA with four solution drawings accompanied by scaled, wooden replica solution models. The experimenter said that the purpose of the study was to investigate puzzle-solving concepts and that the participant would have 2 min to work on a sample puzzle to gain familiarity with SOMA. Following this warm-up, the experimenter said that the participant was going to work for 20 min on three of the puzzles (i.e., the same number of puzzles used in the Zuckerman et al., 1978, study). As the participant puzzle-solved, the experimenter sat at a separate table and surreptitiously kept track of the time on a stopwatch (as explained below). After the 20 min, the experimenter announced that the puzzle-solving phase of the study had come to its conclusion and administered a postexperimental questionnaire to assess the qualities of self-determination and self-report measure of intrinsic motivation (along with filler items). Once the questionnaire had been collected, the experimenter announced that the experiment had come to its conclusion, except that he or she needed to leave the room for 5 to 10 min to collect some materials needed for the debriefing. The experimenter said that the participant may do whatever he or she wanted during this time. In actuality, the experimenter recorded the time the participant played with the puzzle during the free-choice interval; the number of seconds the participant played with the SOMA while alone served as the behavioral measure of intrinsic motivation.

Yoking the puzzle-solving experiences of participants in the option choices condition to participants in the action choices condition required a unique design. We needed to provide participants in the option choices condition with a true opportunity for choice while simultaneously having their choices yoked to those made by participants in the action choices condition. To do this, we ran all 12 participants scheduled for the first day of the 10-day experiment in the action choices condition. Before the second day, we prepared a booklet for the experimenter to use in the other two conditions that charted in detail the puzzle-solving experiences of participants in the action choices condition (i.e., which puzzle was chosen first, how many minutes the participant chose to work on that puzzle, which puzzle was chosen second, and so on). On Days 2–10, participants were randomly assigned into one of the three experimental conditions. Each time a participant was run in the action choices condition, the sheet detailing his or her puzzle-solving experiences was added to the experimenter's booklet for yoking future participants in the option choices condition. Each time a yoked triad was completed, we removed from the booklet the sheet charting the puzzle-solving experience of the yoked participant in the action choices condition.

We designed the action choices manipulation to provide participants with choices over both options and actions. In this condition, the experimenter asked the participant to take a moment to look over the four options and select the one with which he or she most wanted to start. Once the participant chose a puzzle, the experimenter asked him or her to estimate in advance how many minutes out of the 20 the participant might want to work on that puzzle. The experimenter explained that this time-on-puzzle forecast was highly flexible. The participant then forecast a time-on-puzzle (e.g., "I'll work 10 minutes on the 'stairs'"). Once the experimenter noticed that the forecasted time had elapsed, the experimenter asked the participant whether he or she wanted to continue working on that puzzle or switch to another one. We considered this an action choice. If the participant chose to continue, the experimenter again asked for a revised, flexible time-on-puzzle forecast. If the participant chose to switch to a new puzzle, the experimenter removed the first puzzle (i.e., the drawing and the wooden replica) from the table, which left three SOMAs on the tabletop. The experimenter repeated the same procedure as before, except the participant chose from among three rather than four options. The experimenter once again asked the participant to forecast a time-on-puzzle for the second SOMA (to enable another action choice). Following the conclusion of the second puzzle, the experimenter removed that puzzle, which left two SOMAs on the tabletop. The participant chose the third puzzle, and the experimenter removed the unselected puzzle from the tabletop. The participant then worked on the third puzzle until the experimenter announced that the 20 min had expired. Throughout the 20 min, participants had choices over both options (which puzzles to solve) and actions (how to appropriate their time).

We designed the option choices condition to provide participants with a series of choices over options only. In this condition, the experimenter asked the participant to take a moment to look over the four options and select the one with which he or she most wanted to start. To determine how long the participant worked on the first puzzle, the experimenter returned to his or her desk and surreptitiously examined the aforementioned booklet listing the puzzle choices made earlier by the dozen or so participants in the action choices condition. For instance, some participants in the action choices condition chose to start with Puzzle 1, whereas others chose to start with a different puzzle. Once the participant in the option choices condition chose to start with, for instance, Puzzle 1, the experimenter monitored only those prepared sheets in which participants in the action choices condition also chose Puzzle 1. Looking at these half-dozen or so sheets, the experimenter told the participant to stop working at an unannounced but prescheduled time. The experimenter returned to the participant's table, removed the first puzzle (which left three SOMAs on the tabletop), and asked the participant to choose among the remaining three SOMAs. Once the participant chose the second puzzle, the experimenter again returned to his or her table to determine (from the choices made earlier by participants in the action choices condition) how long the participant would work on the second puzzle. At this unannounced but prescheduled time, the experimenter removed the second puzzle and offered the participant a choice between the remaining two puzzles. Once the puzzle was chosen, the experimenter removed the unselected puzzle from the tabletop, and the

participant worked on the third puzzle until the experimenter announced that the 20 min had expired. Throughout the 20 min, participants had choices over options (which puzzles to solve) but not over actions.

We designed the assignment condition to provide participants with a "no-choices," yoked puzzle-solving experience. In this condition, the experimenter asked the participant to take a moment to look over the four options lying on the tabletop and, after a minute, assigned the participant to work on a prescheduled solution, which was the same one chosen earlier by the participants in the two choice conditions. Once a puzzle was assigned, the experimenter determined how long the participant worked on the first puzzle by referring to the time-on-puzzle spent earlier by the participants in the two choice conditions, which were the same or very close to the same. When the unannounced but prescheduled time elapsed, the experimenter removed that puzzle from the tabletop, asked the participant to look over the three remaining puzzles, and, after a minute, assigned the participant to work on the second predetermined (yoked) puzzle. After the time had elapsed for the second puzzle, the experimenter removed that puzzle from the tabletop, asked the participant to look over the two remaining puzzles, and then assigned the participant to work on the third predetermined puzzle. The experimenter called time at the end of the 20 min.

Measures

We used the same postexperimental questionnaire from Studies 1 and 2 to assess participants' self-reports of internal locus, volition, perceived choice, and interest–enjoyment. Internal consistencies were again reasonably high for all four measures: internal locus, three items ($\alpha = .80$); volition, three items ($\alpha = .62$); perceived choice, three items ($\alpha = .97$); and interest–enjoyment, six items ($\alpha = .92$). To construct a single, coherent measure of intrinsic motivation, we once again combined the self-report and behavioral measures ($r = .42$, $p < .01$) by first standardizing each measure and then averaging the two *z* scores into a single composite measure.

Results

Mean scores on internal locus, perceived choice, volition, and intrinsic motivation for participants in each of the three conditions appear in Table 6. Participants offered action choices reported a more internal locus than did participants in the other two conditions, who did not differ significantly from one another, $F(2, 63) = 6.37$, $p < .01$. Participants offered action choices and participants offered option choices (who did not differ significantly) reported more perceived choice than did participants in the assignment condition, $F(2, 63) = 147.32$, $p < .01$. The effect of experimental condition on volition was not statistically significant, $F(2, 63) = 2.35$, $p = .10$. For intrinsic motivation, participants offered action choices showed higher intrinsic motivation than did participants in the other two conditions, who did not differ, $F(2, 63) = 4.20$, $p < .01$.

For the correlational and LISREL analyses, we scored the choice manipulation as −1 (assignment), 0 (option choices), and 1 (action choices). The descriptive statistics and intercorrelations among the five observed variables for all 66 participants appear in Table 7. The action choices manipulation significantly affected internal locus, volition, perceived choice, and intrinsic motivation (rs = .36, .26, .82, and .40, respectively, ps $< .05$). In addition, each hypothesized quality intercorrelated with the other two (range of rs = .30 to .57, ps $< .05$), and all three qualities correlated significantly with the measure of intrinsic motivation (range of rs = .38 to .58, ps $< .05$).

To compare the series of nested conceptual models, we used LISREL analyses. We relied on the same five statistics used in Studies 1 and 2 to evaluate the adequacy of each conceptual model's fit of the observed data. Values for these statistics appear in Table 8. Considered in isolation, two models fit the data well (Models 3 and 4), on the basis of the criteria of a nonsignificant χ^2, χ^2/df ratio < 2, RMR $< .05$, CFI $> .95$, and $p < .05$ for R^2(IM).

To begin the nested models analysis, we tested whether Model 7 fit the data well; it did not: $\chi^2(5, N = 66) = 41.48$, $p < .01$, χ^2/df ratio = 8.30, RMR = .17, CFI = .73, and R^2(IM) = .22, $p < .01$. Next, we tested the fit of the three two-quality models, and each fit the data significantly better than did Model 7: Model 4, $\Delta\chi^2(3, N = 66) = 40.06$, $p < .01$; Model 5, $\Delta\chi^2(3, N = 66) = 22.62$, $p < .01$; and Model 6, $\Delta\chi^2(3, N = 66) = 30.26$, $p < .01$. Thus, we rejected Model 7's three-quality conceptualization in favor of the simpler two-quality conceptualizations (Models 4, 5, and 6). The only two-quality conceptual model to actually fit the data well, however, was Model 4 (PSD → IL, V): $\chi^2(2, N = 66) = 1.42$, *ns*, χ^2/df ratio = 0.71, RMR = .03, CFI = 1.00, R^2(IM) = .52. Both Models 5 and 6 fit the data poorly (i.e., χ^2/df ratios > 5). These data led us to favor Model 4 over Models 5 and 6 (for the same reasons provided in Study 2). Before accepting Model 4, however,

Table 6
Means and Standard Deviations for All Four Dependent Measures in Study 3

	Experimental condition					
	Assignment (control) ($n = 22$)		Option choices ($n = 22$)		Action choices ($n = 22$)	
Dependent measure	*M*	*SD*	*M*	*SD*	*M*	*SD*
Internal locus	3.18_a	1.35	3.23_a	1.13	4.48_b	1.61
Perceived choice	1.95_a	1.38	6.38_b	1.04	6.79_b	0.49
Volition	3.85	1.26	4.17	1.27	4.65	1.18
Intrinsic motivation	-0.32_a	0.73	-0.18_a	0.73	0.50_b	0.85

Note. Means with different subscripts are significantly different from one another according to Student–Newman–Keuls post hoc tests ($p < .05$). Internal locus, perceived choice, and volition were scored on a 1–7 scale, with higher numbers representing a more internal locus, higher perceived choice, and higher volition; intrinsic motivation was scored as a *z* score (a composite of the self-reported and behavioral measures), with higher numbers representing higher intrinsic motivation.

Table 7
Study 3: Descriptive Statistics and Correlation Matrix for Provision for Ongoing Choices, Three Qualities of Self-Determination, and Intrinsic Motivation

Variable	*M*	*SD*	Range	1	2	3	4	5
1. Code for ongoing series of action choices vs. a series of assignments	0.00	0.82	−1.0 to 1.0	—	.36**	.26*	.82**	.40**
2. Internal locus	3.63	1.48	1.0 to 7.0		—	.57**	.30*	.58**
3. Volition	4.22	1.26	1.7 to 6.7			—	.30*	.47**
4. Perceived choice	5.04	2.43	1.0 to 7.0				—	.38**
5. Intrinsic motivation	0.00	0.84	−1.4 to 1.4					—

Note. $N = 66$.
* $p < .05$, two-tailed. ** $p < .01$, two-tailed.

we tested the pair of single-quality nested models. Neither of these two single-quality models (PSD → IL only, PSD → V only) fit the data significantly better than did Model 4, as both models actually had chi-square values greater than did Model 4. These results suggest that (a) Model 4 fit the data overall very well and (b) no simpler conceptual model of perceived self-determination provided a better fit. The path diagram showing the fully standardized parameter estimates for Model 4 appears in Figure 3.

Why did Model 7 (PSD → IL, V, PC) fail to fit the observed data? Model 7 was designed to treat internal locus, volition, and perceived choice as a triad of indicators of a single, latent, coherent construct (perceived self-determination). Statistically, Model 4 (PSD → IL, V) fit the data much better than did Model 7 (PSD → IL, V, PC). To understand why perceived choice failed to function as a useful indicator, we examined the modification indices generated from the LISREL output. These indices suggested the statistical need to treat perceived choice as a separate experience from perceived self-determination (defined as PSD → IL, V). Taking the lead from the modification indices, we constructed a modified model with two mediators, perceived self-determination and perceived choice, and this conceptualization fit the data very well: $\chi^2(3, N = 66) = 2.29$, *ns*, χ^2/df ratio = 0.76, RMR = .02, CFI = 1.00, R^2(IM) = .46. Further, this modified model fit the data significantly better than did the original Model 7, $\Delta\chi^2(1, N = 66) = 39.19$, $p < .01$. The path diagram showing the fully standardized parameter estimates for this modified model appears in Figure 4.

The modified model is important for two reasons. First, the model shows that both perceived self-determination and perceived choice were sensitive to the autonomy-supportive manipulation (the provision of an ongoing series of action choices; *B*s = .42 and .82, respectively, *p*s < .01). Second, the experience of self-determination accounted for a significant proportion of the variance in intrinsic motivation ($B = .62$, $p < .01$), whereas the experience of choice did not ($B = .14$, *ns*). Thus, the original Model 7 failed to the fit the observed data well because internal locus, volition, and perceived choice represent two separate, not one coherent, underlying latent constructs (as shown in Figure 4).

Discussion

The results from Study 3 showed that Model 4 (PSD → IL, V) provided an excellent fit to the observed data and that no simpler conceptual nested model provided a better fit. Model 4 explained an impressive 52% of the variance in participants' intrinsic motivation. In a pattern that repeated itself from Studies 1 and 2, the models that excluded perceived choice fit the data significantly better than did the models that included perceived choice (see the R^2(IM) column in Table 8).

The findings in Study 3 are important because they replicate the pattern of findings found in Studies 1 and 2 (compare Figures 1–3), but they are further important because our "action choices" manipulation did what the option choices manipulation could not, namely affect internal locus, volition, and intrinsic motivation.

Table 8
Study 3: LISREL Results for Each of the Seven Conceptual Models of Self-Determination

Model	χ^2	*df*	*p*	χ^2/df	RMR	CFI	R^2(IM)
1. PSD → IL only	4.25	1	.04	4.25	.08	.91	.34
2. PSD → V only	7.30	1	.01	7.30	.11	.75	.22
3. PSD → PC only	1.84	1	*ns*	1.84	.04	.99	.14
4. PSD → IL, V	1.42	2	*ns*	0.71	.03	1.00	.52
5. PSD → IL, PC	18.86	2	.01	9.43	.13	.84	.20
6. PSD → V, PC	11.22	2	.01	5.61	.10	.90	.20
7. PSD → IL, V, PC	41.48	5	.01	8.30	.17	.73	.22

Note. $N = 66$. RMR = root-mean-square residual; CFI = comparative fit index; R^2(IM) = proportion of variance in intrinsic motivation explained by the model; PSD = perceived self-determination (as a latent construct); → = consists of the following qualities; IL = internal locus (as an indicator of the latent construct of PSD); V = volition (as an indicator); PC = perceived choice (as an indicator).

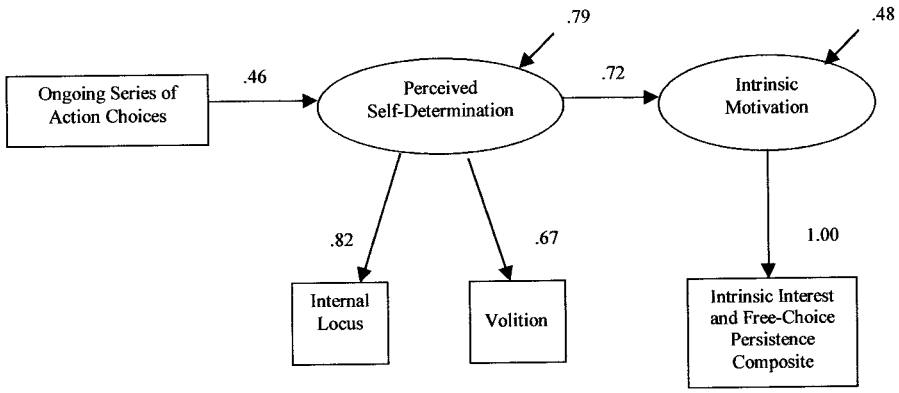

Figure 3. Study 3: Standardized parameter estimates for Model 4 (perceived self-determination → internal locus, volition). Solid lines indicate significant standardized path coefficients ($p < .01$).

These results confirm, at least within the context of our laboratory conditions, that types of choices exist and, further, that option choices do little to affect participants' experience of self-determination in intrinsic motivation. Only when the provision for choice included choices over one's actions did it engender an experience capable of affecting perceived self-determination and, hence, intrinsic motivation.

General Discussion

We conceptualized and studied perceived self-determination as an ephemeral, situation-specific, statelike subjective experience, one that rises and falls in response to autonomy-supportive versus controlling conditions and one that affects intrinsic motivation. Our plan was to identify the qualities hypothesized by others to constitute the subjective experience of self-determination, assess them reliably, confirm that they were sensitive to autonomy-supportive conditions, and validate that they predict traditional measures of intrinsic motivation. In all three studies, the findings suggest that internal locus and volition, but not perceived choice, constitute valid indicators of the experience of self-determination in intrinsic motivation. This conclusion has implications for theory, classroom practice, and assessment.

Theoretical Implications

Much of the study of human motivation involves the concept of intentionality (Deci & Ryan, 1987). Having an intention implies personal causation (deCharms, 1987). However, two decades of research on intrinsic motivation make it clear that intentions that originate within oneself ("internal causality," deCharms, 1987, p. 16) produce qualitatively better functioning and enhanced well-being than do intentions that have been coerced, seduced, or manufactured by an external causality. This research literature provides the theoretical support to give perceived locus of causality its central status in understanding the experience of self-

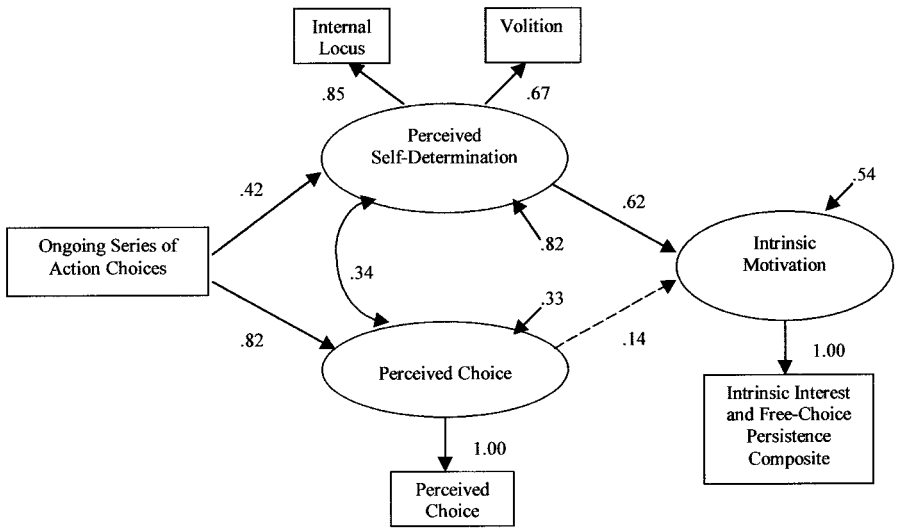

Figure 4. Study 3: Standardized parameter estimates for a modified version of Model 7 featuring two latent variables mediating between choice and intrinsic motivation. Solid lines indicate significant standardized path coefficients ($p < .01$). Dashed line indicates nonsignificant path.

determination in intrinsic motivation. Our findings support this status. An internal locus by itself, however, fails to capture the full sense of perceived self-determination. Internally locused intentions can originate in ways that are either autonomous and fully endorsed by the self or controlled and regulated by pressure-inducing intrapersonal forces, such as ego-involvements (Ryan, 1982), inner tensions (e.g., Zeigarnik effect; Reeve, Cole, & Olson, 1986), rigid standards (Shapiro, 1981), and introjected pressures (Ryan & Connell, 1989). Internally locused, volitional intentions produce better functioning and enhanced well-being to a greater extent than do internally locused, nonvolitional intentions (Kuhl, 1992; Ryan et al., 1992; Ryan et al., 1996; Sheldon & Kasser, 1998). This research literature provides the theoretical support to give volition a near-equal status to that of perceived locus of causality in understanding the experience of self-determination in intrinsic motivation, and our findings support this status.

The status of perceived choice as a quality of perceived self-determination was not confirmed. We did substantiate that the environmental provision for choice could function as an autonomy-supportive condition, at least as operationally defined in Study 3, and we address this point in the next section. As to the *experience* of perceived choice, however, a latent construct that included internal locus and volition but excluded perceived choice (i.e., Model 4) predicted intrinsic motivation better than did a latent construct that included all three hypothesized qualities (i.e., Model 7). In all three studies, the two-quality conceptualization of self-determination that included internal locus and volition (Model 4) explained an impressive amount of the variance in intrinsic motivation, and adding perceived choice as an additional indicator of perceived self-determination (Model 7) actually decreased the explained variance. We conclude that once the variance in intrinsic motivation explained by internal locus and volition has been accounted for (i.e., partialed out), perceived choice does not predict intrinsic motivation. Alternatively, treating perceived choice and perceived self-determination as separate constructs best explained the data (see Figure 4).

The conceptualization of perceived self-determination suggested by Model 4 (PSD → IL, V) does not fit precisely with the existing definition of perceived self-determination, which is as follows:

> Self-determination is the capacity to choose and to have those choices, rather than reinforcement contingencies, drives, or any other forces or pressures, be the determinants of one's actions. . . . When self-determined, one acts out of choice rather than obligation or coercion, and those choices are based on an awareness of one's organismic needs and a flexible interpretation of external events. (Deci & Ryan, 1985b, p. 38)

To integrate our findings with this definition requires a reconceptualization of "the capacity to choose." The experience of choice can be understood in both a cognitive–attributional sense and a motivational sense (Deci & Ryan, 1985b). As a cognitive concept, the concept of choice applies whenever the person decides to do something. For instance, a teacher can give a student the choice of writing in cursive or in print, and when the student decides to write in print, he or she has the cognitive–attributional experience of choosing (i.e., deciding). The cognitive–attributional sense of the capacity to choose centers on option choices presented by some outside agent. As a motivational concept, however, the concept of choice applies only whenever the person possesses a sense of freedom with respect to the action. That is, "a behavior is truly chosen only if the person could seriously consider not doing it. The inflexibility of a person having to do a behavior and not being able to seriously consider other options suggests that the behavior does not represent true choice, even if it was decided on" (Deci & Ryan, 1985b, p. 155). From a motivational point of view, "the capacity to choose" involves the capacity to act or not, which we refer to here as an action choice.

Given this line of reasoning, we suggest the following modification for the earlier definition of perceived self-determination:

> Self-determination is the capacity to determine one's actions as they emerge from an internally locused and volitional causality, rather than from an externally locused causality (e.g., reinforcement contingencies) or from an internally locused but nonvolitional causality (e.g., drives, intrapsychic pressures). When self-determined, one acts out of an internally locused, volitional causality based on an awareness of one's organismic needs and a flexible interpretation of external events.

These two definitions are very similar. The second definition, however, highlights that self-determined actions emanate from an internally locused and volitional sense of causality rather than from a sense of choice per se. Conceptually, and from a motivational perspective, the "capacity to choose" has much to do with an internally locused and volitional sense of causality but little to do with the attributional experience of deciding between options. Further, an internally locused, volitional causality has its origins in one's organismic needs and environmental affordances.

This shift in terminology carries key implications for classroom practice. The second definition rather boldly asserts that the experience of self-determination is not something that can be given to the student through the presentation of an array of teacher-determined options (e.g., "Here are six books; which do you want to read today?"). If we take action choices seriously, that means that teachers need to really work with students to nurture self-awareness of their own needs (and the full range of internally locused, volitional sources of causality, including not only needs but also interests, preferences, internalizations, values, goals, and aspirations; Deci & Ryan, 1991).

Practical Implications: The Conundrum of Choice

When teachers attempt to promote self-determination in students, a popular instructional method is to provide teacher-determined options (e.g., Schraw et al., 1998). Our findings showed that this method did increase perceptions of choice (see the .45, .73, and .82 correlations in Tables 2, 4, and 7). These increases in perceived choice, however, failed to translate into corresponding increases in intrinsic motivation. Such findings leave the provision for choice a conundrum, because we are left with the riddle as to why we found that choice did not increase intrinsic motivation whereas others have found that it has (Cordova & Lepper, 1996; Zuckerman et al., 1978). To solve this riddle, we offer two points for consideration.

First, in reading over past studies, we found that in each positive case (i.e., choice increased intrinsic motivation) the choice manipulation was designed in such a way that it increased not only perceived choice but also internal locus and volition (e.g., Cordova

& Lepper, 1996; Zuckerman et al., 1978). In contrast, in each negative case (i.e., choice did not increase intrinsic motivation), the choice manipulation was designed to increase only perceived choice (e.g., Overskeid & Svartdal, 1996; Schraw et al., 1998). Hence, if the provision for choice is going to affect the experience of self-determination in intrinsic motivation, then it needs to be designed in such a way that it increases internal locus and volition. Our option choices manipulation illustrates a negative case, because we offered participants choices only from among experimenter-determined options; our ongoing action choices manipulation illustrates a positive case, because we offered participants choices over the initiation and regulation of their behavior.

Second, the provision for choice, by itself, does not necessarily produce a positive effect on perceived self-determination, whereas the provision for choice in the context of additional autonomy-supportive conditions does. In the study that best illustrates this point, Deci and his colleagues (1994) offered some participants the provision for choice and offered participants in another condition the provision for choice in the context of additional autonomy-supportive facilitating factors (namely, acknowledging feelings and providing rationale). By itself, the provision for choice increased the experience of choice but did not increase free-choice behavior; in the context of additional autonomy-supportive facilitating conditions, choice increased not only the experience of choice but also free-choice behavior. Hence, in practice, the provision for choice is best considered as one contributing element within a larger autonomy-supportive manipulation, relationship, motivating style, or classroom climate (e.g., Reeve et al., 1999; Turner, Meyer, Cox, Logan, DiCintio, & Thomas, 1998). Within the context of additional autonomy-supportive facilitating conditions, we suspect that the provision for choice is much more likely to be presented as a choice over options and actions and less likely to be presented as a choice over options only. Consequently, when teachers offer students choices as part of their classroom activities, the provision for choice is more likely to increase self-determination and intrinsic motivation when it is presented along with facilitating conditions, such as acknowledging negative feelings, providing rationale for unappealing choices, and asking students questions about what they do and do not want to do.

Assessment Implications

To assess internal locus, volition, and perceived choice, self-determination researchers currently use relatively simple measures that are open to criticisms of validity and internal consistency. Given the purpose of our investigation, the three-item scales we used worked well and allowed us to achieve our assessment goal of unidimensional measurement. In future investigations, these measures will need to be improved. Here, we offer our recommendations toward that end.

Of the three qualities, perceived choice has received the most extensive psychometric attention. Our three-item measure borrowed items from Ryan's (1982) previously developed and validated seven-item scale. These items, however, assess perceived choice over options only. Given our findings, new items are needed to assess perceived choice over actions (e.g., perceived choice concerning what to do, whether to do it, when to do it, how long to do it, when to stop doing it, and whether to switch to something else; for a sample of such items, see Reeve, 2002, p. 199). It remains an open and theoretically pressing question as to whether a questionnaire measuring "perceived choice among actions" will assess a valid indicator of perceived self-determination. The answer would have important implications for our conclusion that perceived choice is not a core quality within the experience of self-determination in intrinsic motivation.

No scale currently exists to assess perceived locus of causality, at least not as an ephemeral, statelike experience within the context of research on either self-determination or intrinsic motivation. Rather, single items are typically used to ask the respondent why he or she engaged a particular task—because it was something you wanted to do or because it was something the environment made you do (see, e.g., E. P. Thompson et al., 1993). A useful scale would feature items for both internal causality and external causality (because perceived locus of causality is conceived of as a bipolar continuum). Internal causality items would ask the extent to which internal resources such as needs, interests, and preferences initiated and regulated one's actions, whereas external causality items would ask the extent to which social agents and environmental incentives initiated and regulated one's actions.

Volition is the scale that requires the greatest amount of attention, a claim we offer for two reasons. First, the alpha coefficients for our volition scale were the lowest of the three scales (.81, .60, and .62, respectively, in Studies 1–3). Second, in retrospect, our conceptualization of volition might have been too narrow, given the advances made in the past decade on the role volition plays in how people self-regulate their intentional behavior (Corno, 1993; Corno & Kanfer, 1993; Kuhl, 1992, 1996). Self-determination theorists conceptualize and operationally define volition as high psychological freedom and low psychological pressure (Deci et al., 1996). When looking at volition in the broader context of self-regulating one's behavior, the focus is on the individual's metacognitive management of one particular course of action in the face of competing interests and goals, social and introjected pressures, and a multitude of environmental distractors. We suspect that much can be gained by merging these two conceptualizations of volition. The resulting scale might include items to assess feeling free and feeling pressured (i.e., the experience of volition in intrinsic motivation), but it might further include items to assess commitment to one course of action rather than another, willingness to invest effort, willingness to persist, willingness to overcome obstacles, willingness to inhibit competing courses of action, and a sense of holistic versus conflicted or alienated functioning (i.e., the experience of volition in self-regulation).

Limitations

Three aspects of our research methodology limit the external validity of our conclusions, which were that (a) option choices do not increase intrinsic motivation and (b) perceived choice is not a valid indicator of self-determination. First, the data we collected and interpreted were obtained exclusively from college-aged (mostly female) participants. As to possible gender differences, we were able to test for gender effects across all three studies and found that our results generalized to both genders. As to possible age differences, however, we were not able to test for these effects. It is conceivable that age differences exist to limit our conclusions, because others have found age differences in how external events affect intrinsic motivation. For instance, extrinsic rewards under-

mine children's intrinsic motivation to a greater extent than they undermine college-age participants' intrinsic motivation (Deci et al., 1999), presumably because rewards are used more frequently to control children's behavior and because adults have a greater capacity to interpret rewards as informational rather than as controlling events. Extending this same train of thought, environmental opportunities to choose and subjective experiences of choice might be both more frequent and more informational for adults. Still, if option choices do not increase intrinsic motivation for adults, then they probably do not increase intrinsic motivation for children either (because option choices are probably rarer and less informational for children). But, action choices might increase intrinsic motivation more for adults than for children. We acknowledge the need to test the hypothesis that action choices increase intrinsic motivation for children.

Second, the data we collected and interpreted were obtained in laboratory settings. Before we can assert that our findings are applicable to the classroom setting, we need to ask school-aged children to report their experiences of self-determination in response to classroom events. For instance, whereas we asked participants to work on a series of unfamiliar puzzles for 30 min in either a self-determined or an experimenter-determined way (Study 3), a future investigation might ask high school students to work on *Romeo and Juliet* for a week in either a student-determined or a teacher-determined way. We would expect that when a teacher asks students what they want to do, how they want to learn the material, which questions and answers will be pursued, and how and when learning will be assessed, students would show relatively higher levels of self-determination and intrinsic motivation (compared with when a teacher tells students what to do, how to learn the material, what the right questions and answers are, and how and when learning will be assessed).

Third, all three studies used only a relatively interesting activity (i.e., Happy Cubes, SOMA), because our focus was to study self-determination in intrinsic motivation. Fortunately, others have shown that the motivational dynamics related to self-determination during interesting activities (Deci et al., 1982; Flink et al., 1990; Reeve et al., 1999) apply in kind to self-determination during relatively uninteresting activities (Deci et al., 1994; Ryan, Connell, & Deci, 1985). Still, it remains necessary to investigate people's experience of self-determination during all tasks, not just during interesting ones. That is, whereas the present investigation focused on the experience of self-determination in intrinsic motivation, we need to continue this research to include a focus on self-determination in extrinsic motivation as well. Recognizing these three limitations, we recommend that our conclusions be tested in future research with children, in classroom settings, and for uninteresting activities.

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