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Planting a Tree While Envisioning the Forest—The Recursive Relation Between Theory and Research: Reply to Blustein (2003)

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In his comments regarding D. M. Tokar, J. R. Withrow, R. J. Hall, and B. Moradi's (2003) article, "Psychological Separation, Attachment Security, Vocational Self-Concept Crystallization, and Career Indecision: A Structural Equation Analysis," D. L. Blustein (2003) offered several useful suggestions for future research in the area of relationship variables and career development and also raised several concerns about Tokar et al.'s rationale for and use of structural equation modeling in testing their models. In this reply, the authors note points of agreement with Blustein and respond to comments with which they disagree.

We thank David L. Blustein for his thoughtful reactions to our article on psychological separation, attachment security, vocational self-concept crystallization, and career indecision (Tokar, Withrow, Hall, & Moradi, 2003). Blustein's (2003) comments challenged us to reconsider and clarify our thinking about several related issues as they pertain to our study, including (a) the role(s) of theory in scientific inquiry, (b) the potential uses and limitations of structural equation modeling (SEM) in vocational psychology research, (c) the inherent complexity of the linkages between relational processes and vocational behavior, and (d) the distinctiveness of our measures of vocational self-concept crystallization and global career indecision. In the sections that follow, we respond to each of these issues.

The Role(s) of Theory in Scientific Inquiry

In Tokar, Withrow, Hall, and Moradi (2003), we tested two similar models in which psychological separation and attachment security variables were related to career indecision and in which those relations were mediated through vocational self-concept crystallization. Our central hypothesis—that greater separation and attachment security would be related to less career indecision—was heavily influenced by the work of Lopez and Andrews (1987) and Blustein, Prezioso, and Schultheiss (1995), who conceptualized career indecision as "a symptom of inadequate parent–young adult separation" (p. 304) and a manifestation of "the absence of felt security" (p. 428), respectively. Theory and empirical research also guided hypotheses regarding the relations of separation and attachment security to vocational self-concept crystallization (e.g., Bowlby, 1982; Erikson, 1968; Mikulincer, 1995), the relation of vocational self-concept crystallization to career indecision (e.g., Barrett & Tinsley, 1977; Super, Starishevsky, Matlin, & Jordaan, 1963), and the mediational role of vocational self-concept crystallization in relations of separation and attachment security to career indecision (e.g., Blustein et al., 1995; Lopez & Andrews, 1987; Super et al., 1963).

Despite our best efforts to incorporate theory into the selection of our variables and our research hypotheses, Blustein (2003) suggested that the theoretical rationale (or, rather, the apparent lack thereof) for our mediator model "represents a leap of inferential faith that raises significant questions about the role of theory in the SEM within psychological research" (p. 20). Blustein further suggested that neither his (i.e., Blustein et al., 1995) nor Lopez and Andrews's (1987) propositions constitute a highly precise theory that could be tested by using SEM or other means. These objections appear to reflect his concern that researchers should not engage in the unwitting, "shotgun" application of techniques such as SEM without the guidance of theory, a concern that we share.

However, Blustein's (2003) commentary also seems to imply that a prerequisite for applying analytic techniques such as SEM is that research questions are derived from a comprehensive and widely accepted theoretical framework. Unfortunately, to our knowledge, no such comprehensive theory related to our model exists, although of course we relied heavily on the existing psychological literatures on separation, attachment, self-concept and identity development, and career development to create our model. Indeed, it seems to us that too strict a reliance on what has already been done may sometimes stifle discovery—the very research that offers the most potential for gain in knowledge will frequently involve one or more "inferential leaps." Furthermore, we note that such an approach is not inconsistent with what Hetherington (2000) referred to as "Strong Theory" (p. 41), that is, the intentional, explicit application of theory to the research process. As Hetherington observed, "Strong Theory does not require the preexistence of a single, generally accepted theoretical framework, but that the relevant theoretical landscape be thoroughly explored and explicitly incorporated in designing the research, and collecting and analyzing the data" (p. 42).

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Thus, in our view, Blustein's (2003) comments reflect a limited conceptualization of the role(s) of theory in scientific inquiry, emphasizing what Hetherington (2000) referred to as the "instrumental, pragmatic" (p. 38) function. This perspective recognizes theory's fundamental role in guiding research questions, selecting an appropriate research design and analytic strategy, and providing a frame of reference for interpreting research findings. The other major role of theory, according to Hetherington, is the culmination of scientific research. This perspective emphasizes the generation of an explanatory theory as the primary goal of science. We regard both roles of theory as important and complementary, and we attempted in our research to both use extant theory to guide the research process and to advance the literature by demonstrating initial empirical support for our proposed model. It is through the recursive relation between theory and research that extant theoretical models are refined and expanded (Hetherington, 2000). Using Blustein's "trees" and "forest" metaphor, we believe that empirical research by necessity examines the trees because no one study can examine the entire forest. However, there must be an iterative, recursive relationship between the trees and the forest, such that the landscape of the forest guides the planting of new trees, the fruit and seeds of which re-create our vision of the forest.

Potential Uses and Limitations of SEM in Vocational Psychology Research

Blustein (2003) clearly communicated his concern about our using SEM to test a model "specify[ing] precise causal connections" (p. 21) before a more systematic and precise theoretical base is in place. We would like to clarify that making strong causal inferences was not our intended purpose. Consistent with the positivistic tradition that guided our research, we did not set out to definitively confirm precise causal links between the variables under investigation. Rather, we used SEM to test the plausibility of the proposed model, given the limitations of our data. As we noted on p. 15 of our original article (Tokar et al., 2003), the cross-sectional nature of our design by necessity precluded strong causal inferences. In that same paragraph, we also explicitly acknowledged the possibility that alternative models would fit our data equally well and, like Blustein (p. 21), raised the possibility of reversed directional relationships (e.g., from career indecision to vocational self-concept crystallization). We also encouraged future researchers to extend our findings by using longitudinal and experimental designs to test more directly the causal links between the variables of interest.

We generally agree with Blustein (2003) that the naive application of modern multivariate techniques such as SEM has the potential to obscure and impede, rather than advance, our understanding of the relations among variables important to vocational psychology researchers. Sophisticated multivariate techniques such as SEM are not appropriate substitutes for theory in guiding scientific inquiry. However, as is also true for other analytic approaches, SEM may still be of benefit in research contexts where strong causal inference is precluded, and even where exploratory data analysis is indicated. Unfortunately, some writers have used the term *causal modeling* synonymously with *structural equation modeling*. This practice has made *SEM* and *causality* equivalent to many people and has obscured the flexibility of SEM as a general tool for exploring the consistency of one's data with a set of alternative models (e.g., Shipley, 2002). An important point to reiterate is that assertions of causality depend not on the analytic technique used but on aspects of the research design such as random assignment and longitudinal measurement that allow one to eliminate alternative explanations such as reversed casual direction and third variable explanations (e.g., Cook & Campbell, 1979). Making causal claims inappropriately is as much of a problem when a more familiar analytic technique such as multiple regression or analysis of variance is used as when SEM is used.

We believe that one of the advantages of SEM as a technique is that its use demands that researchers give more explicit consideration to specifying the underlying theoretical models that are being tested. Note, however, that it is important not to invest the term *theory* in this context with more than its intended meaning. A better choice of terms might be *research propositions*. These propositions may be derived from past empirical or theoretical works, or they may be a priori expected relationships advanced by the researcher as an extension to existing knowledge—There is no requirement of a distinguished theoretical lineage! Furthermore, the best applications of SEM test not a single model but a series of implied models (for example, comparing a complete mediation model vs. a partial mediation model), to determine which of those models is most consistent with the data. Admittedly, SEM can be misused and abused. However, it is our hope that the appropriate use of SEM may aid researchers to think more deeply about not only the relationships that they expect to find in their data but also about the potential to simultaneously test additional theoretically competing relationships. If so, there is the potential for SEM to have an overall positive effect on research in vocational psychology. Of course, any line of research that depends on a single quantitative or qualitative approach is likely to be deficient, so it is equally important that other methods also be used to gain a fuller understanding of any vocational phenomenon.

The Inherent Complexity of the Linkages Between Relational Processes and Vocational Behavior

The latter half of Blustein's (2003) comment was devoted largely to highlighting the challenges inherent in career (and other) researchers' investigation of complex, intrapersonal phenomena such as psychological separation–individuation and the experience of attachment security. Blustein called on career researchers to consider alternative pathways to illuminating the complex associations among relational variables and work-related phenomena, and he offered several excellent suggestions. Specifically, Blustein encouraged researchers to "straddle the edges of the modern and postmodern eras of social scientific research" (p. 22) by framing their questions with a postmodern, multiperspectival lens and by using more exploratory, qualitative analytic strategies in addition to traditional quantitative approaches. We support Blustein's position that a diversity of epistemological perspectives and research methodologies will best advance science, and we anticipate that Blustein's thought-provoking suggestions will stimulate progress in the area of relationship variables and career development.

Distinctiveness of Our Measures of Vocational Self-Concept Crystallization and Global Career Indecision

An important construct validity issue raised by Blustein (2003) was the distinctiveness of the vocational self-concept crystallization and global career indecision constructs. In response to this, we

first argue that a conceptual distinction can be made between these two constructs, although there are also reasons to expect the two constructs to covary relatively strongly. *Vocational self-concept crystallization* refers to the extent to which one has a clear sense of one's own, vocationally relevant aptitudes or abilities, interests, and attitudes. In contrast, *career decision* involves a motivated combination of that self-knowledge with other information (e.g., about potential vocations), into a set of choices and strategies that will allow one to find an acceptable fit between self and job. Certainly, indecision could occur primarily because there is a deficiency in self-knowledge—this may result from a lack of experiences that generate self-knowledge or when others' assessments (e.g., parents, peers) of one's interests and abilities have been uncritically assimilated. But indecision could also occur when the individual is relatively knowledgeable about the self. For example, an individual might have a good sense of his or her capabilities and interests but be reluctant to "grow-up" and accept that he or she must be self-supporting. Or, one might yet need to acquire adequate information about different career choices.

However, it is important to not only establish that we can define and make a conceptual distinction between these two constructs but to also demonstrate that our empirical methods in fact separate them. We pursued this issue by using the data described in the original study (Tokar et al., 2003), and report here a series of additional analyses not included in the original article. Specifically, we investigated the factor structure of a set of items including both the 40 Vocational Rating Scale (VRS; Barrett & Tinsley, 1977) items used to measure vocational self-concept crystallization and the 16 Career Decision Scale (CDS; Osipow, Carney, Winer, Yanico, & Koschier, 1987) items used to measure career indecision. This was done by using a series of maximum-likelihood (ML) unrestricted exploratory factor analyses, with promax rotation. In other words, we let each item load on all factors in factor models that had from one to four dimensions. The advantage of the ML estimation approach is that it allows one to get indices of the overall fit of the factor structure to the data so that the fits of factor structures of different dimensionalities may be assessed and compared. Results from these analyses are summarized in Table 1 and are described in more detail below.

If the VRS and CDS measured essentially the same construct, then we would expect either that a single-factor solution would show an adequate fit to the items from these two measures (a strong version of the "single construct" argument) or, at least, that items from the two scales would tend to intermingle indiscriminately in their loadings on multiple factors (a weaker version of the "single construct" argument). The strong version of this argument is quickly eliminated, as can be seen from the fit indices reported for the single-factor model in the top line of Table 1. A well-fitting model should have a root-mean-square error of approximation (RMSEA) of .06 or less, and a standardized root-mean-square residual (SRMR) of .05 or less. The single-factor model violates both of these guidelines. Furthermore, the chi-square difference test shows that the two-factor model fits significantly better than the one-factor model.

Table 1
Model Fit Indices for Maximum-Likelihood Exploratory Factor Analysis of Combined Vocational Rating Scale and Career Decision Scale (Indecision Scale) Items

Factor	χ^2	*df*	RMSEA	*p*RMSEA	SRMR	$\Delta\chi^2$	Δdf
1	3602.9	1484	.064	<.001	.0563		
2	2962.8	1429	.055	.001	.0448	640.1	55
3	2552.1	1375	.049	.614	.0389	410.7	54
4	2271.9	1322	.045	.993	.0348	280.2	53

Note. For all chi-squares, $N = 350$. RMSEA = root-mean-square error of approximation; *p*RMSEA = probability that RMSEA ≤ .05; SRMR = standardized root-mean-square residual.

The factor models with two, three, or four factors all have significant improvements in fit over any model of a lower dimensionality. Furthermore, their values of RMSEA and SRMR are within guidelines for acceptable fit. Our purpose here is not to choose one of these models as an optimal model but rather to determine whether the CDS items measure something distinct from the VRS items. In all three of these factor models, all but two of the CDS items had their strongest loading on a factor that was not the primary factor for any of the VRS items. Thus, the weak version of the "single construct" argument also clearly does not hold. Furthermore, our findings do not appear to be idiosyncratic to our sample. Tinsley, Bowman, and York (1989) factor analyzed item responses to various career-decision-making-related inventories, including the VRS and CDS, and found that the CDS Indecision subscale items composed a well-defined factor separate from factors that included VRS items.

Conclusion

In closing, we once again thank David L. Blustein for his thought-provoking comments, and we appreciate the opportunity to respond. In his comments, Blustein (2003) indicated that, in their article on attachment relationships and career development, he and his colleagues (Blustein et al., 1995) "sought to integrate a small number of empirical studies in conjunction with a robust theoretical framework (i.e., Bowlby, 1988) to develop some propositions to guide subsequent research" (p. 21). Consistent with Blustein et al.'s (1995) intentions, we used their and others' propositions and empirical findings to guide our research. Thus, rather than viewing our work as representing a "leap of inferential faith" (Blustein, 2003, p. 20), we view it as one more step, building upon prior steps, in the development of the literature on work and relationships.

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