Person-Environment Fit and its Effects on University Students: A Response Surface Methodology Study

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Abstract The amount of time, effort, and money expended in pursuit of a college degree makes it important that students choose a university that is a good fit for them. Unfortunately students often determine whether a university is a fit for them through trial and error. This research investigated student-university fit and its relationship with satisfaction and well-being. We assessed student-university fit by developing 18 fit factors and measuring needs for, and supplies of, those factors. We tested our hypotheses using polynomial regression analysis and response surface methodology. Data from 228 students suggest that student-university fit is predictive of students' satisfaction with their university and psychological well-being.

Keywords Person-environment fit · Student-university fit · Psychological well-being · University satisfaction

College is an expensive undertaking—both monetarily and psychically. The amount of time, effort, and money expended in pursuit of a college degree makes it important that students choose a university that is a good fit for them. As Solórzano (2004) characterizes it, "picking THE right school is one of the most important, overwhelming, pressure-filled, confusing, and nerve-wracking ordeals a student will ever encounter" (p. vii). The choice students make has important consequences. Poor student-university fits are likely to result in decreased satisfaction, well-being, and performance. Good fits, however, should make college less stressful and reduce chances of dropping out or transferring. As Williams (1986) notes, "admission

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officers for years have been concerned with fitting, or matching, entering student characteristics with institutional needs, believing a good match will result in satisfied graduates" (p. 1). Students fortunate enough to achieve good fits should be more likely to emerge from college with high self-esteem and self-efficacy. The degree of student-university fit, therefore, may have long-lasting attitudinal and career outcomes. Our interest in reducing the incidence of poor student-university fit has made us want to learn more about measuring student-university fit and its outcomes. Unfortunately Rand's (1968) observations about knowledge gaps are still valid today: "There still remains a need for more information about (1) the characteristics of colleges and students that are important to college matching, (2) the specific types of colleges for which these characteristics are relevant, and (3) the type of students to whom the findings can be applied" (p. 39). This article, which addresses some of those issues, reports our investigation of the effects of college students' degree of fit with their university.

We used person–environment (P–E) fit theory as our conceptual framework in investigating the effects of student-university fit. P–E fit theory is based on the assumption that well-being and performance is a function of the interaction between people and their environment, and that good fits promote well-being and contribute to feelings of mastery, self-confidence, and satisfaction (Edwards and Rothbard 1999; Gilbreath 2004; Kristof 1996; Moos 1988). Conversely, poor fits are expected to result in negative outcomes such as dissatisfaction, boredom, depression, somatic complaints, and increased smoking and drinking (Edwards and Rothbard 1999; French et al. 1974; Leyden and Kuk 1993). P–E fit is central to some conceptualizations of mental health: "Our basic notion conceives of *adjustment* as the goodness of fit between the characteristics of the person and the properties of his environment" (French et al. (1974), p. 316).

This study contributes to the literature and practice in several ways. First, although researchers have devoted some effort to understand the effects of student-university fit, there has been no published field study that assesses student-university fit in a way that allows one to know whether students' needs are being met, not met, or overly met. Second, this is the first study to theorize and test how student-university fit influences student outcomes using polynomial regression and response surface methodology (Edwards and Parry 1993). These more sophisticated approaches can capture the potential complexity of the joint effects of students' needs and a university's supplies (Edwards and Parry 1993). Specifically, it allows us to test whether students' psychological well-being and satisfaction with the university increase, decrease, or remain constant as a university's supplies fall short of, or exceed students' needs, and as needs and supplies increase jointly from low to high. Third, by identifying the dimensions of student-university fit and examining both students' needs and the extent to which a university meets those needs, this study can provide suggestions for universities to improve their academic and physical environments to attract and nurture students in more effective ways.

Literature Review and Hypothesis Development

Although there have been studies of various sub-environments such as students' fit with an instructor, other students, their major, or the residence hall in which they live (e.g., Cook 1987; Feldman et al. 2004; Nafziger et al. 1975; Porter and Umbach 2006; Rubio and Lubin 1986; Tracey and Sherry 1984; Westerman et al. 2002), because our focus is on fit with the university, that is also the focus of our discussion of the literature.

The first study of student-university fit we were able to find was published by Pervin in 1967. Pervin investigated discrepancies between student perceptions of themselves and

their university. He developed an instrument, the Transactional Analysis of Personality and Environment (TAPES), aimed at assessing "interactions and transactions that occur within a college environment, and their relevance to institutional strain and student satisfaction" (p. 291). Using the semantic-differential technique, students assessed their college, themselves, faculty, administration, other students at their college, and their ideal college. Pervin found a relationship between high self-college discrepancies and dissatisfaction, leading him to conclude that "there is an optimum fit between student and college, the qualities of which will vary for different students and different colleges" (p. 299).

Conyne (1978) was one of the first to focus on sources of student-university mismatch. He assessed one university's campus environment and identified eight major types of mismatch. As an example, Conyne found a mismatch between students' desire for practical knowledge and concrete applications and their perception that faculty generally provided theoretical and abstract content. Although he believed effective matches to be associated with lower levels of dysfunction, Conyne didn't report the effects on students of the mismatches he identified.

Roberts and Robins (2004) conducted a longitudinal study to measure the antecedents and consequences of student-university fit on students' personality development. They found that antecedents of fit included conscientiousness, gender (i.e., being male), higher high school GPA, higher SAT scores, lower agreeableness, and lower neuroticism. In terms of consequences, better P–E fit was related to increases in self-esteem and decreases in agreeableness and neuroticism. Their measure of fit, however, was somewhat limited in its usefulness because they used a ranking method. Students were asked to rank the characteristics of their actual and ideal university, which results in quite a bit of lost information. For example, the first- and third-ranked item may be nearly equivalent in value to a respondent, or they may be significantly different, a possibility not captured using rank ordering.

Wintre et al. (2008) developed a 17-item measure of student-university fit, scores on which proved to be predictive of students who stayed ("persisters") and those who deregistered ("leavers"). They also conducted interviews with leavers and persisters at several universities. The factor mentioned most often by leavers were "characteristics of the campus or its immediate physical surroundings" (Wintre et al. 2008), p. 754).

Our review of the literature led us to a number of conclusions. Studies of overall student-university fit have been few and far between. While there has been some effort to gain a better understanding of the effects of fit (and misfit), there has been no sustained effort to identify a comprehensive set of relevant fit factors at the university-wide level. Moreover, methodology has generally been rudimentary or idiosyncratic (e.g., Wiese 1994). As a result, we can say very little about factors important in determining student-university fit and the effects of fit and misfit. As Falk (1975) noted, "clearly, if one is to deal seriously with the complex problems of the student-environmental fit, more systematic and quantitative efforts will be needed to articulate the dynamics of student-environmental interactions" (p. 30). We hope to reduce that knowledge gap with this study. By using a rigorous approach, we want to increase understanding of fit factors important to college students. In addition, we want to gain a better understanding of how needs for and supplies of various fit factors affect students' psychological well-being and satisfaction with their university.

Research Hypotheses

Our interest is in individual-level consequences of student-university fit. Although there are a variety of types of P–E fit (e.g., person–organization, person–vocation, demands–abilities, person–group, self-concept–job; Gilbreath 2008; Kristof 1996), we focused on

needs-supplies fit between students and universities. Needs-supplies fit, defined as the congruence between a person's needs and what the environment supplies, is regarded as the primary influence on outcomes such as attitudes and well-being (Kristof 1996). While the deprivation of needs can result in psychological, physiological, or behavioral strains (Edwards and Harrison 1993; French et al. 1974), need fulfillment generally leads to positive outcomes (Dawis and Lofquist 1984; Porter 1962). In this study, student-university fit is defined as the congruence between students' needs and a university's environment. That is, student-university fit refers to the compatibility between what students want to have in a university and the characteristics of their university.

The general hypothesis guiding our study is that fit between students' needs and the extent to which their university meets these needs will have positive effects on their psychological well-being and satisfaction with the university. Specifically, students will be satisfied with their university and experience positive mental states when their university provides the environments that they like to have. Studies conducted in work settings (e.g., Kristof-Brown et al. 2005) have shown that the degree of P–E fit significantly influences individuals' attitudes and psychological well-being. Employees with a high degree of fit with an organization have high levels of positive attitudes toward the organization and experience positive mental states. Extrapolating from this, students will be satisfied with their university and feel positive, confident, and secure when their university provides an environment that satisfies their needs.

Conversely, students will be dissatisfied with their university and less able to relax or enjoy themselves without difficulty when their university's environment is not congruent with their needs. According to Kristof-Brown et al. (2005), when an organization cannot satisfy employees' needs, values, and preferences, they become less satisfied with their jobs and less committed to the organization. Extrapolating from this, when the supplies of what students want in a university environment are less than desired, they may experience lower levels of psychological well-being and satisfaction with their university.

In some cases a university may supply more of an environmental characteristic than is needed. We, like others (e.g., French et al. 1974), see no reason to predict any negative effects from that, although we do believe that, once needs are met, the effects of additional supplies will decrease (but remain positive). Edwards and Rothbard (1999) propose two ways excess supplies can produce positive outcomes. The first is *conservation*, when excess supplies on one factor are retained to fulfill needs on the same factor in the future. The second is *carryover*, when excess supplies for one need are used to fulfill other needs (Edwards 1996). Because of the possibility for conservation and carryover, we predict that:

Hypothesis 1a   University satisfaction will increase as supplies increase toward needs but increase at a decreasing rate as supplies exceed needs.

Hypothesis 1b   Psychological well-being will increase as supplies increase toward needs but increase at a decreasing rate as supplies exceed needs.

The extent to which universities supply various needs obviously differs, but so does the extent to which students need a university characteristic. We expect that students' satisfaction with their university and psychological well-being will increase as their needs and university environment supplies increase from low to high. In other words, we hypothesize that the satisfaction (via supply) of more important needs will have a greater effect than the satisfaction of less important needs. For example, two students could attain need-supply congruence for state-of-the-art classrooms, labs, and libraries. However, this congruence

presumably would have greater effects on a student for whom this was highly important (high need, high supply) than for one for whom this was not important (low need, low supply). This argument is consistent with person-job fit studies suggesting that fit at higher levels of both person and job components are generally associated with more positive employee outcomes than fit at lower levels (Jansen and Kristof-Brown 2005; Livingstone et al. 1997). Therefore, we predict that:

Hypothesis 2a   University satisfaction will increase as needs and supplies both increase from low to high.

Hypothesis 2b   Psychological well-being will increase as needs and supplies both increase from low to high.

Method

Sample and General Procedure

Study participants were recruited at two commuter campuses in Indiana. With instructor permission, researchers visited a variety of college classes to solicit participation. Students with a wide assortment of majors were recruited. A total of 252 students completed questionnaires. Of the 252 responses returned, 24 were excluded in the analysis due to missing data and outliers; thus, a total of 228 responses were used in our analyses. The mean age of respondents was 25. Slightly less than half (48%) of them were women, and 85% were Caucasian. The class standing of respondents was as follows: freshmen, 15%; sophomore, 19%; junior, 31%; senior, 31%; and graduate, 4%.

Measures

Student-University Fit

As noted earlier, information about determinants of student-university fit is scarce. Therefore, our first task was to identify potentially important fit factors. We agree with Caldwell et al. (2008) that "because people and situations are multidimensional, meaningful and valid tests of fit hypotheses require comprehensive descriptions of both persons and situations" (p. 357). This prompted us to use a variety of methods to identify fit factors. First, we reviewed the literature on the effects of college on students, as well as the few student-university fit studies that have been published. Second, we conducted focus groups with students to learn more about criteria they use to conclude that their university is or is not a good fit for them. Third, we conducted a focus-group session with a group of academic advisors and counselors to learn their perspectives about what leads to good or poor student-university fit. Fourth, we independently generated our own lists of factors that might be pertinent to student-university fit. Those processes led to the identification of 18 fit items, which we incorporated into a self-report questionnaire.

Respondents were instructed to provide information on their needs by responding to the item, "How important is this to you?" and on supplies by responding to the item, "To what extent is this true of your university?" We asked respondents to provide normative information on needs and supplies using a response format ranging from 1 (*not at all*) to 7 (*very much*).

Table 1 Principal axis factor analysis for student-school fit items

Item	Social environment	Academic environment	Physical environment
Enjoyable social life	**.76**	.20	−.03
Sports and recreational opportunities	**.76**	.14	.01
Great student body	**.58**	.36	.26
A highly regarded athletic reputation	**.59**	.27	.01
Great support services (e.g., academic counseling, health care, and placement center)	**.58**	.12	.34
Great non-academic facilities (e.g., gyms, dining, and game room)	**.58**	.04	.18
A diverse student body	**.43**	.30	.11
A scholarly/intellectual campus climate	.29	**.67**	.21
State-of-the-art classrooms, labs, library	.12	**.62**	.26
A highly regarded academic reputation	.23	**.74**	.08
Great school size	.23	**.62**	.08
Great geographic location	.13	.25	**.47**
A safe environment	.06	.22	**.58**
A pleasing physical environment (aesthetics)	.40	.37	**.42**
Convenient campus lay-out	.01	.32	**.64**
Great affordability	.14	−.23	**.70**
Eigen-value	3.10	2.54	1.99
Variance explained	19.36	15.84	12.41

To test how the fit items (totaling 18 items) factored, we conducted principal axis factor analysis (PAFA) with the items for needs. PAFA showed that a three-factor solution was appropriate, the substance of which consisted of the items for social environment (seven items), academic environment (four items), and physical environment (five items). The items loading on social environment tend to describe students' social life at a university. The items loading on the second factor (i.e., academic environment) tend to describe the university's academic reputation and resources. Finally, the items loading on physical environment tend to describe a university's physical features such as location and lay-out. The labels we've given to the categories, as well as the fit factors they encompass, are shown in Table 1. The items that did not fit into any of the categories were "a feeling of pride and school spirit" and "a student body whose values are similar to yours."

University Satisfaction

Students' satisfaction with their university was measured with three items used by Edwards and Rothbard (1999), which were drawn from Hackman and Oldham (1980) and Ironson et al. (1989). We reworded the items by making the referent a university rather than a job. The items are "all in all, the university I have is great," "in general, I am satisfied with my university," and "my university is very enjoyable."

Psychological Well-Being

Psychological well-being was measured with Nowack's (1991) ten-item measure, which assesses the degree to which respondents' mental state is characteristically positive. Example items are "feeling positive, confident, and secure with yourself," "feeling mentally and physically calm, relaxed, and free of tension," and "able to relax and enjoy yourself without difficulty."

Control Variables

Variables that are not central to our theory but have been found to influence students' well-being and performance were treated as control variables. Specifically, we measured gender, age, and ethnicity.

Analysis

We tested the effects of student-university fit on students' psychological well-being and satisfaction with their university using polynomial regression analysis (Edwards 1996; Edwards and Parry 1993). We chose this approach because it enhances the rigor of P–E fit research, transcends some of the limitations of other approaches (e.g., difference scores), and expands the range of hypotheses that can be tested (Edwards 2008; Yang et al. 2008). Our analyses estimate quadratic regression equations whose dependent variables consist of satisfaction or psychological well-being and whose independent variables consist of students' needs and university supplies, along with three quadratic terms constructed from these measures. We refer interested readers to Edwards and Rothbard (1999) for a detailed description of the procedure.

Surfaces corresponding to the quadratic regression equations were further analyzed using response surface methodology (Edwards and Parry 1993). As Harrison (2008) aptly describes this approach,

> they [response surface methodology techniques] do not provide an index of fit so much as they provide an in-depth view of how particular regions of stipulated fit and misfit on each attribute are connected in different ways to different psychological consequences. (p. 401)

Results

Descriptive statistics, reliability estimates, and correlations for all measures are reported in Table 2. As shown there, all reliability estimates exceeded .70 except for academic-environment need, physical-environment supply, and physical-environment need ($\alpha = .62$, .59, and .54, respectively). The mean of physical-environment need is higher than social- and academic-environment need (mean = 5.89 vs. 4.06 and 5.35), suggesting that students emphasize physical environment more than social and academic environment when they describe their ideal university. Correlations between a university's supplies and satisfaction and psychological well-being are greater than those between students' needs and the outcomes, consistent with other studies that examined supplies-needs fit (e.g., Edwards and Rothbard 1999).

Table 2 Means, standard deviations, correlations, and coefficients for study variables

Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11
1. Gender[a]	.48	.50	–										
2. Age	25.44	7.94	.18	–									
3. Ethnicity	1.23	–	–.07	.03	–								
4. Social environment-need	4.06	1.24	–.14	–.33	.06	(.80)							
5. Social environment-supply	4.16	.99	.04	–.14	.04	.38	(.79)						
6. Academic environment-need	5.35	.97	.14	.05	.08	.46	.27	(.59)					
7. Academic environment-supply	4.87	.94	.10	.15	.07	.18	.59	.38	(.72)				
8. Physical environment-need	5.89	.68	.21	.09	–.03	.38	.18	.51	.25	(.54)			
9. Physical environment-supply	5.45	.77	.05	–.02	.03	.18	.45	.22	.49	.39	(.62)		
10. University satisfaction	4.93	1.15	.07	.00	.02	.09	.53	.24	.54	.19	.50	(.87)	
11. Psychological well-being	5.06	.92	–.07	.05	.17	.10	.20	.24	.39	.12	.30	.36	(.90)

Notes: (N = 228). Reliabilities are in *parentheses*. For all correlation above .13, $p < .05$; for all correlations above .17, $p < .01$.

[a] Males were coded as 0, and females were coded as 1. For ethnicity, White was coded as 1, African American as 2, Hispanic as 3, Asian as 4, and Native American as 5 and others as 6

The Effects of Student-University Fit on Outcomes

Analyses of surfaces pertaining to H1a through H2b are reported in Table 3. Recall that H1a predicted that students' satisfaction with the university would increase as supplies increase toward needs but would increase at a decreasing rate as supplies exceeded needs. Support for this hypothesis would be evidenced by a positive linear slope along the N = $-$S line at the point N = 0, S = 0 (i.e., a positive value for $b_1 - b_2$ and a negative and non-significant value for $b_3 - b_4 + b_5$). Consistent with H1a, a positive slope was found for academic environment, as shown in Table 3 (i.e., $b_1 - b_2 = .49$, $p < .01$; $b_3 - b_4 + b_5 = -.23$, n.s.). These relationships are portrayed in Fig. 1a. Specifically, the surface along the N = $-$S line (the line running diagonally from the left corner to the right corner) shows that university satisfaction linearly increased as the difference between need and supply increased from -6 to 6. The same pattern was found for physical environment, as shown in Table 3 ($b_1 - b_2 = .81$, $p < .01$; $b_3 - b_4 + b_5 = -.46$, n.s.). However, for social environment, the downward curvature along the N = $-$S line was significant for students' satisfaction with the university (i.e., $b_3 - b_4 + b_5 = -.26$, $p < .05$). That is, students' satisfaction with the university increased as supplies increased toward needs, but it decreased as supplies for social environment exceeded needs. The latter relationship is portrayed in Fig. 1b. Thus, H1a was supported for only academic and physical environment.

Table 3 Results from quadratic regressions of outcomes on supplies and needs for university

	Control for age, gender, and ethnicity						Shape along N = S line		Shape along N = $-$S line	
	S	N	S^2	NS	N^2	R^2	a_x	a_x^2	a_y	a_y^2
Social environment										
University satisfaction	.64**	$-.09$	$-.07$	.16*	$-.04$	.32**	.55**	.05	.73**	$-.26$*
Psychological well-being	.20**	.02	.12	.00	.03	.12**	.23**	.15*	.18	.14
Academic environment										
University satisfaction	.54**	.05	$-.09$	.14	.00	.33**	.59**	.06	.49**	$-.23$
Psychological well-being	.35**	.15	$-.03$	.01	$-.03$	.18**	.50**	$-.05$	.19	$-.07$
Physical environment										
University satisfaction	.76**	$-.04$	$-.03$	.30	$-.13$	.27**	.72**	.14	.81**	$-.46$
Psychological well-being	.46**	.03	.25**	$-.13$	.06	.17**	.49**	.18	.43	.44

Notes: N ranged from 226 to 228. Unstandardized regression coefficients were used. Columns labeled a_x (i.e., $b_1 + b_2$) and a_x^2 (i.e., $b_3 + b_4 + b_5$) represent the slope of each surface along the N = S line, and columns labeled a_y (i.e., $b_1 - b_2$) and a_y^2 (i.e., $b_3 - b_4 + b_5$) represent the slope of each surface along the N = N = $-$S line (b_1, b_2, b_3, b_4, and b_5 are the coefficients on N, S, N^2, NS, S^2, respectively). A quadratic regression equation that tests the effects of student-university fit is as follows: Student outcomes = $b_0 + b_1S + b_2N + b_3S^2 + b_4SN + b_5N^2 + e$. S and N represent a university's supplies and students' needs. Hypotheses 1a and 1b were tested by setting N equal to $-$S. Hypotheses 2a and 2b were tested by setting N equal to S
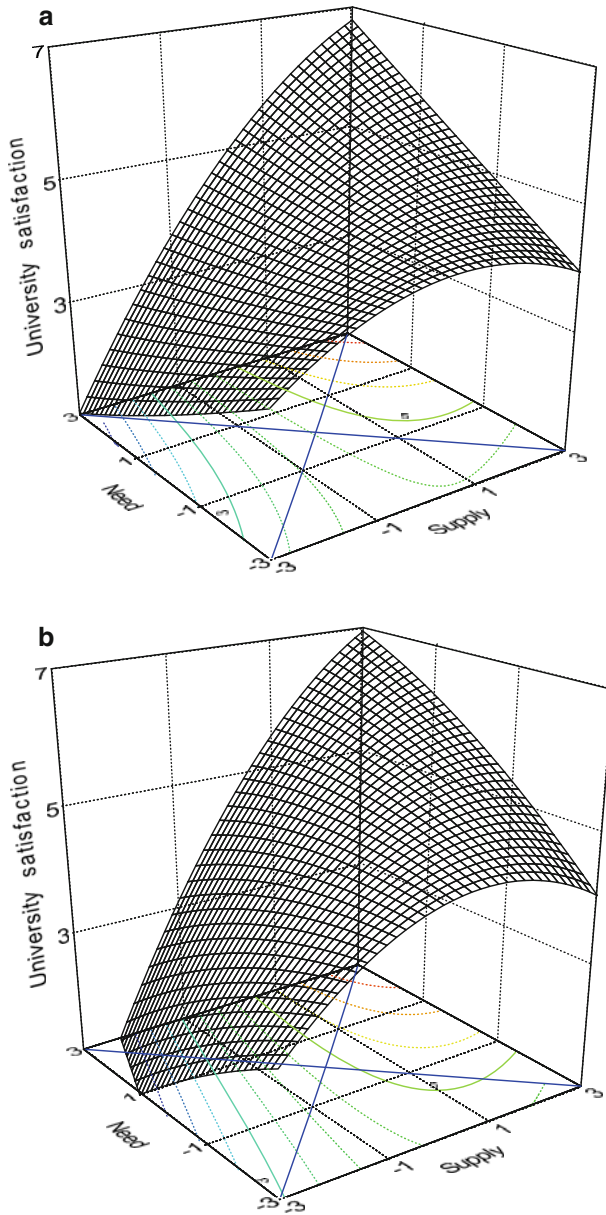
* $p < .05$, ** $p < .01$

Fig. 1 University satisfaction on student-university fit **a** academic and **b** social environment

H1b stated that students' psychological well-being would increase as supplies increase toward needs but would increase at a decreasing rate as supplies exceed needs. Consistent with this, for all fit characteristics, students' psychological well-being significantly increased as supplies increased toward needs (i.e., a positive value for $b_1 - b_2$ for all environment categories), as shown in Table 3. In addition, Table 3 shows that for academic environment, as supplies exceeded needs, psychological well-being continued to

increase at a decreasing rate ($b_3 - b_4 + b_5 = -.07$). However, for social and physical environment, as supplies exceeded needs, psychological well-being continued to increase at an increasing rate, as shown in the positive value for $b_3 - b_4 + b_5$ for both social and physical environment, as shown in Table 3 (i.e., .14 and 44). Thus, H1b was supported for only academic environment.

Recall that H2a predicted that university satisfaction would increase as needs and supplies both increased from low to high. If H2a is supported, $b_1 + b_2$ would be positive and significant and $b_3 + b_4 + b_5$ would not differ from zero (equations are included in the *notes* section of Table 3). Consistent with this, Table 3 shows that $b_1 + b_2$ was positive and significant and $b_3 + b_4 + b_5$ was not significant for social environment, academic environment, and physical environment. For example, along the N = S line (the line running diagonally from the near corner to the far corner of the horizontal plane), university satisfaction increased as both needs and supplies for academic environment increased, as shown in Fig. 1a. Thus, H2a was supported.

H2b predicted that psychological well-being would increase as needs and supplies both increased from low to high. Consistent with this, for academic and physical environment, $b_1 + b_2$ was positive and significant and $b_3 + b_4 + b_5$ was not significant, as shown in Table 3. However, for social environment, $b_3 + b_4 + b_5$ was significant, calling for another analysis to investigate this case. Following the approach recommended by Edwards and Rothbard (1999), we tested whether psychological well-being differed at the high and low score along the S = V line. We found that psychological well-being was higher for high supply and need scores (i.e., 1.23) than for low supply and need scores (i.e., $-.99$). These results provide support for H2b.

Discussion

Our study had several purposes. First, we wanted to identify important factors that can be used to assess student-university fit. Using a variety of methods, we identified 18 fit factors and incorporated them into a self-report questionnaire. Exploratory factor analysis extracted three categories of fit: social environment, academic environment, and physical environment. Those seem to us to be reasonable and face valid categories useful for conceptualizing university environments. Most of our fit factors address what Ostroff and Schulte (2008) refer to as person-situation fit, wherein the environment is defined in terms of contextual or situational attributes. For example, we asked about the university's geographic location, sports and recreational opportunities, and the degree to which the campus is safe. However, we also measured some aspects of person–person fit, assessing the environment in terms of the characteristics of the people within it (Ostroff and Schulte) using questions about the student body (i.e., diversity, values). Future studies are needed to examine whether the three categories are replicable in other contexts (e.g., other universities and non-commuter campuses).

A second purpose of the study was to examine how student-university fit affects students' psychological well-being and satisfaction with their university. The results of this study are generally consistent with the hypothesized relationships regarding the effects of student-university fit on student outcomes. First, students' psychological well-being and satisfaction with their university increased as supplies increased toward needs. This finding is consistent with conclusions of previous student-university fit research (Conyne 1978; Rubio and Lubin 1986). Second, with regard to the academic and physical environment, as supplies exceeded needs, students' satisfaction with their university increased at a decreasing rate. This finding

is consistent with our assertion that excess supplies may be used to fulfill other values for students, thereby increasing students' psychological well-being and satisfaction. This is supported by the positive correlations among social, academic, and physical environment supplies, as reported in Table 2. Third, students' psychological well-being and satisfaction with their university were significantly higher when needs and supplies were both high than when both were low. This suggests universities should consider what students want from the university and how much they want it. In our sample the fulfillment of higher-valued needs was associated with positive outcomes.

Although most hypothesized relationships were supported, some were not. For example, for physical environment, as supplies exceeded needs, psychological well-being significantly increased at an increasing (rather than a decreasing) rate. One plausible explanation is that the physical environment provides resources students need to succeed in their social and academic life without requiring students to put forth effort in response to the excess.

We also found that students' satisfaction with the university decreased as supplies for social environment exceeded needs. Two processes have been proposed that could account for this: depletion and interference. *Depletion* occurs when excess supplies reduce the likelihood that needs on the same dimension will be met in the future (Edwards and Rothbard 1999). *Interference* occurs when excess supplies inhibit needs-supplies fit on other factors (Edwards and Rothbard). We suspect that interference may be the source of our results, because too much social-environment supplies could tempt students away from their academic tasks or lure them into spending more time and money on social pursuits than is ideal.

We should note the limitations of our study, however. First, our data were collected at only two universities, both located in Indiana, so the generalizability of our results is limited. Replication of our study at other commuter universities would be helpful, followed by replication at traditional (non-commuter) universities. A second limitation of the study regards the reliability levels of some of our student-university fit factors. Academic-environment need, physical-environment supply, and physical-environment need had reliabilities that were slightly below .70. As a result, our conclusions regarding those variables must be taken with caution although our results would be more conservative since we found significant results with a low reliability. Future studies are needed to develop more reliable measures of those characteristics.

Also, our self-report, questionnaire-based data collection method leaves our findings vulnerable to single-source bias. In future studies of this type it could helpful to, when possible, utilize multiple data sources. For example, roommates' or significant others' reports of students' well-being, although difficult to obtain, could serve as a complementary source of data that could help rule out single-source bias. It would also be helpful if future studies of this type collected data at different points in time to reduce the potential for common-method variance (Kristof-Brown and Jansen 2008).

We believe our results may have practical applications. Banning and McKinley (1980) note that "a major roadblock to further advancement lies in the difficulty of conceptualizing the environment. Ways are needed to conceptualize the campus environment so that both the theorists and the practitioner can understand and use the potential for student development that lies within the environment" (p. 41). The method we have used to conceptualize the environment in terms of needs and supplies, and in terms of social, physical, and academic characteristics, may prove useful.

We agree with Williams (1986) that "enrollment managers should know what goals and expectations students bring with them to the campus in order to ascertain whether these goals and expectations are realistic ones that can reasonably be met within the campus

environment. A major source of new student dissatisfaction often arises as a result of unfulfilled expectations" (p. 2). The consequences of unmet expectations can be severe (Gilbreath 2004), so it will be worthwhile to reduce the frequency of their occurrence. Universities may be able to meet expectations better by focusing on needs rated highly important by students.

Several authors have noted the importance of student-university fit for the university's well-being (e.g., Clarke 1987; Francis and Kelly 1990). This is plausible in the sense that better fit should result in improved retention, including groups of students the university is specifically targeting. People are beginning to understand that they need to look at multiple characteristics of universities before they (or their children) enroll, and low retention rates don't lead to positive perceptions. As constituents expect more transparency among academic institutions, low retention rates will become more obvious. The U. S. now has the Voluntary System of Accountability (Voluntary 2009) that manages the College Portrait system that provides indicators of the student experience. And college guides such as Best Buys in College Education (Solórzano 2004) and U.S. News and World Report Best Colleges (U.S. News 2009) factor graduation rates into their ratings. The fact is, student success rates are becoming public domain (E. J. Frew, personal communication, July 10, 2009).

Fit information could result in improved recruitment efforts if universities make use of it to guide their marketing and promotion efforts. It should be possible to clearly discuss how a university fits various high-value needs or to phrase marketing toward students with specific subsets of needs. Furthermore, universities might use information about needs and supplies to inform strategic planning and budgeting (e.g., What should be emphasized in the next 1, 5, 10 years? What should be deemphasized?). If student needs are being exceeded in one category (e.g., social environment, in our study), more resources could be devoted to other needs during the next budget cycle.

Better fit should result in higher student satisfaction as measured by standardized measures, thus enhancing campus reputation. It might also result in a better campus climate and better learning. Students who are expending less resources attempting to cope with a social or physical environment that doesn't suit them could devote more attention to their studies. These and other positive effects from good student-university fit could lead alums to be more positive about their campus, making them more likely to donate to their alma mater and recommend it to potential students.

Avenues remain to be explored. One is whether misfit can result in positive outcomes. As Huebner (1980) notes, "there is some conceptual support for the notion that a degree of misfit, or optimal incongruence, enhances personal growth and is to be preferred over a perfect fit between person and environment" (p. 129). This seems possible, particularly where students may prefer to be around similar others, but who would be likely to grow in empathy by being exposed to different others in a highly developmental period in their life (e.g., young adulthood). However, merely inserting students into an environment awash with others unlike them is risky because they may remove themselves from that environment. A key would seem to be interactions with different others in a respectful, accepting environment (Gloria and Kurpius 2001).

The use of indirect measurement, which allows one to measure both how much students need a particular factor, and how much the environment supplies, will provide more useful information for practical applications. So will more specific fit factors. Direct measurement of general characteristics (e.g., To what extent do you feel there is a match between you and your needs and that of your present university regarding the academic challenges; Wintre et al. 2008) won't tell you whether students are finding the environment too challenging or not challenging enough.

Although we used indirect measurement in this study, our fit items and the method for assessing them are in need of refinement. For example, asking respondents to provide information on their needs by responding to the item, "How important is this to you?" does not permit precise measurement of the amount of a given fit item a student wanted. This is potentially important because a fit characteristic may be highly important but may be satisfied with relatively little supply. However, asking about the amount needed, rather than the importance, of a fit item would have presented other challenges. We believe it would be difficult for students to specify how much (i.e., the amount) they need of many potentially important fit factors. For example, how does one specify the amount of a pleasing physical environment (one of our items) one needs? Measuring the relative importance of a variety of fit items, as a proxy for needs, and comparing that with what students perceive about their university regarding those same fit items does permit one to, albeit somewhat imperfectly, assess congruence between students' needs and a university's environment.

One problem with advancing this area of research has been the independent, disconnected nature of the studies. Researchers don't seem to be reading each other's work. Evidence of this can be found by looking at articles in the Journal of College Student Personnel. Only one out of eight citations that could have been made were made, a hit rate of 12.5%. Said another way, the 1987 articles (Clarke 1987; Cook 1987) made only one of six potential citations of articles *in the same journal*. And neither of the 1984 articles (Tracey and Sherry 1984; Witt and Handal 1984) cited Conyne (1978), also in the same journal. This problem is not exclusive to earlier decades. Wintre et al.'s (2008) study, for example, does not cite Roberts and Robin's (2004) study.

The "silos" within which academic units are housed also may be impeding progress. There seems to be no consultation of work between, for example, the fields of organizational behavior and clinical psychology. We agree with Ostroff (2008) who noted that

> fit research and theory have developed almost independently within each domain. There has been almost no overlap or integration in theoretical perspectives across domains. Further, different techniques and methodologies for assessing fit have been developed within domains, with little cross-fertilization across domains. (p. viii)

We hope that researchers interested in student-university fit will begin to collaborate with each other or at least consult each other's work.

Conclusion

As Moos (1979) noted, "the educational setting must first be adequately conceptualized before its impact on students' attitudes and behavior is evaluated" (p. 20). Our study is a step in that direction. It is the first known use of response surface methodology to explore student-university fit. We hope that our methodology and fit factors prove useful to others who want to assess student-university fit and examine its effects.

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