Non-Tenure Track Faculty Satisfaction: A Self-Determination Model

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Abstract

Full-time non-tenure track faculty, commonly referred to as NTT faculty, are increasingly utilized in higher education and shoulder much of the teaching load within academic institutions. Self-determination theory (SDT) has shown promise as a conceptual frame for characterizing the relationship between environmental support factors and NTT faculty satisfaction. Full-time NTT faculty were sampled nationwide (N = 3,527) to investigate an SDT-based model positing basic psychological needs (i.e., volitional autonomy and relatedness) as mediators between six environmental support indices and NTT faculty satisfaction (i.e., teaching/service and global satisfaction). Structural equation model results showed volitional autonomy and relatedness fully mediated the relationships between the six environmental supports and both indices of faculty satisfaction. Results highlight the utility of basic psychological needs in understanding the relationships between the environment and NTT faculty satisfaction. Implications, future directions, and limitations are also presented.

Keywords

NTT faculty satisfaction, self-determination theory, volitional autonomy, relatedness, academic environmental supports

Disciplines

Environmental Studies | Psychology | School Psychology | Teacher Education and Professional Development | Theory and Philosophy

Comments

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Abstract

Full-time non-tenure track faculty, commonly referred to as NTT faculty, are increasingly utilized in higher education and shoulder much of the teaching load within academic institutions. Self-determination theory (SDT) has shown promise as a conceptual frame for characterizing the relationship between environmental support factors and NTT faculty satisfaction. Full-time NTT faculty were sampled nationwide ($N = 3,527$) to investigate an SDT-based model positing basic psychological needs (i.e., volitional autonomy and relatedness) as mediators between six environmental support indices and NTT faculty satisfaction (i.e., teaching/service and global satisfaction). Structural equation model results showed volitional autonomy and relatedness fully mediated the relationships between the six environmental supports and both indices of faculty satisfaction. Results highlight the utility of basic psychological needs in understanding the relationships between the environment and NTT faculty satisfaction. Implications, future directions, and limitations are also presented.

Keywords: NTT faculty satisfaction, self-determination theory, volitional autonomy, relatedness, academic environmental supports
Non-Tenure Track Faculty Satisfaction: A Self-Determination Model

Charged with preparing future generations to compete in an increasingly demanding market, faculty members at academic institutions represent central resources in higher education. Given the centrality of their duties to intellectual and economic progression, it is imperative that faculty perform at the highest possible level. As faculty satisfaction has been linked with enhanced job performance (Judge, Thoresen, Bono, & Patton, 2001), academic institutions require faculty who are content in their positions. Full-time non-tenure track (NTT) faculty represent a rapidly-growing faculty subpopulation that has been underrepresented in the psychological and educational literatures (Curtis & Thornton, 2013) and were the focus of the present study.

Job satisfaction among faculty can be viewed as an index of overall well-being (Van Horn, Taris, Schaufeli, & Schreurs, 2004). From this perspective, academic institutions must support faculty job satisfaction among NTT faculty in order to enhance faculty wellness, individual faculty member performance, and institutional strength of the university as a whole. Previous investigation into faculty satisfaction has revealed that aspects of the academic environment such as institutional leadership, perceptions of campus climate and culture, as well as relationships with colleagues, students, and administrators can all predict the degree to which faculty are satisfied in their positions (e.g., Eagan, Jaeger, & Grantham, 2015; Hagedorn, 2000; Moors, Malley, & Stewart, 2014).

While prior research has been effective in identifying factors that foster or hinder faculty satisfaction among heterogeneous groups of faculty, few studies have examined the environmental supports specific to NTT faculty, whose roles vary widely and differ significantly from the responsibilities of tenure track faculty. Further, much of the literature that includes NTT faculty does not distinguish between full-time and part-time NTT faculty. Representing a strength of the current investigation, the sample was composed entirely of full-time NTT faculty in order to rectify this unfounded overgeneralization. The present study examined six environmental supports that were hypothesized to predict NTT faculty satisfaction: 1) upper
level administrative support, 2) chair support, 3) institutional support, 4) contract renewal and promotion clarity, 5) recognition support, and 6) personal and family support.

**Non-Tenure Track Faculty**

NTT faculty, also known as contingent or term faculty, refers to university educators signed to temporary contracts as university employees who are not tenure-eligible. NTT faculty hiring within US colleges and universities has drastically increased. A recent analysis of appointment status found that 70% of faculty members in higher education have NTT faculty status (Curtis & Thornton, 2013). One recent analysis (Baldwin & Chronister, 2001) cited numerous reasons for the significant shift in higher education from tenure-track to NTT appointments, the majority of which stem from financial pressure. These included increased competition from nontraditional and for-profit institutions, an increased demand for college education across American society, and the need for institutions to conserve financial resources and preserve staffing flexibility. Considering the large proportion of faculty holding NTT status along with the evidence suggesting this trend will continue, efforts to evaluate and enhance environmental support for this population represent an opportunity to revolutionize the faculty experience for employees across institutions.

Additionally, because NTT faculty and tenure track faculty have significantly different occupational requirements such as NTT faculty teaching more undergraduate courses (Schuster & Finkelstein, 2006), it seems necessary to distinguish between the environmental needs of each group. NTT faculty are typically paid significantly less than their tenure track counterparts and hired for shorter contracts (Ehrenberg & Zhang, 2005). Also, NTT faculty often do not receive satisfactory health and retirement benefits and are often not represented in institutional governing bodies (Baldwin & Chronister, 2001; Curtis & Thornton, 2013). This creates a significant power deficit for NTT faculty. Differences in power and compensation between tenure track and NTT faculty could lead to varied relationships between environmental supports and job satisfaction for each group. As such, direct evaluation of environmental supports that are salient to NTT faculty
(e.g., contract renewal and promotion clarity) becomes essential for understanding mechanisms responsible for improving NTT faculty satisfaction.

Yet, in turning to the empirical literature, few studies were located that focused exclusively on NTT faculty satisfaction. Investigations have predominantly utilized qualitative methodology to identify factors that contribute to NTT faculty perceptions of effective job performance (e.g., de Saxe Zerden, et al., 2015; Kezar, 2013b; Kezar, 2013c). Quantitative examinations have also explored differences in teaching strategies between tenure track and NTT faculty (Baldwin & Wawrzynski, 2011), as well as willingness to provide academic accommodations to students with disabilities (Bourke, Strehorn, & Silver, 2000), but have not addressed faculty job satisfaction. Another study (Reevy & Deason, 2014) established a link between job contingency and NTT faculty mental health outcomes in demonstrating that the lack of a permanent faculty position predisposed NTT faculty to depression, anxiety, and stress. However, this study did not incorporate a guiding theory for explaining the mechanism through which this relationship manifests. To date, only one recent investigation (Seipel & Larson, 2018) used self-determination theory (SDT) as a conceptual frame for describing the relationship between environmental supports and NTT faculty satisfaction.

**Self-Determination Theory**

SDT (Deci & Ryan, 1985; Ryan & Deci, 2000) was developed as a theory of human motivation. It posits that motivation exists on a continuum from external motivation (i.e., actions driven by anticipated consequences aligned with social values) to internal motivation (i.e., actions driven by one’s desire to satisfy their own curiosity or need for mastery). According to SDT, extrinsically motivated actions can become self-determined as the social values that govern extrinsically motivated behavior become integrated and internalized into one’s own value system. Values become internalized through the fulfillment of three basic psychological needs: volitional autonomy (the need to make one’s own choices), perceived competence (the need to feel effective in dealing with the environment), and relatedness (the need for mutual connection
with others). A corpus of theoretical and empirical literature suggests that fulfillment of these needs and increased self-determined behavior results in an enhanced state of well-being.

An SDT sub-theory, cognitive evaluation theory (CET; Deci & Ryan, 1985), focuses on volitional autonomy and perceived competence as fostering intrinsic motivation and thereby enhancing well-being within specific domains (e.g., NTT faculty job satisfaction) that require specific environmental supports (e.g., department chair support). Relationships Motivation Theory (RMT; Deci & Ryan, 2014), an additional SDT sub-theory, suggests that relatedness also mediates the relationship between the environment and domain-specific satisfaction. A third sub-theory of SDT, basic psychological needs theory (BPNT; Ryan & Deci, 2002), posits that psychological well-being is contingent upon the fulfillment of the three basic needs and that failing to satisfy these needs results in functional deficits. Further, BPNT argues that these three needs are universal aspects of human functioning that transcend culture and race/ethnicity (Chen et al., 2015; Vansteenkiste & Ryan, 2013). Applied to the academic environment, CET, RMT, and BPNT offer a conceptual frame for faculty satisfaction that uses SDT’s three basic psychological needs as mediators of the relationships between environmental supports and faculty job satisfaction for all NTT faculty.

Recent meta-analyses have demonstrated that the SDT needs are robust predictors of outcomes across diverse domains including physical and mental health (Ng et al., 2012), school performance (e.g., Hummel & Randler, 2012), and burnout (Li, Wang, & Kee, 2013). Seipel and Larson (2018) provided empirical evidence that the SDT relatedness need fully mediated the relation between their three environmental supports and two indices of satisfaction in a sample of full-time NTT faculty. However, this investigation offered a limited portrayal of environmental supports, had a relatively small sample size, and sampled only one institution. The current analysis sought to build on previous work (e.g., Seipel & Larson, 2018) by expanding an SDT-based model to include more environmental supports while examining the model in a larger, more diverse national sample of full-time NTT faculty.
The authors utilized an archival dataset of full-time NTT faculty who completed the Harvard Collaborative on Academic Careers in Higher Education (COACHE) faculty job satisfaction survey (Benson, Mathews, & Trower, 2014), a widely-used measure for assessing and improving institutional deficiencies that impact faculty (e.g., Larson et al., 2017; Ott & Cisneros, 2015; Seipel & Larson, 2018). As shown in the hypothesized model in Figure 1, the authors predicted that volitional autonomy and relatedness would fully mediate the relationships between six environmental support variables (outlined below) and two indices of faculty satisfaction, namely teaching and service satisfaction and global satisfaction. Questions addressing perceived competence were not included in the COACHE dataset, resulting in the inability to include perceived competence in the current analysis.

**Environmental Supports and Faculty Satisfaction**

In order for institutions to best understand and support NTT faculty satisfaction, a keen understanding of the environment in which satisfaction occurs is critical, as that represents an important area where administrators and departmental leadership can intervene. Consistent with previous conceptualization of the NTT faculty environment (Seipel & Larson, 2018), the present study operationalized six environmental supports from the COACHE survey that are salient to NTT faculty. These supports are described below along with literature supporting their relations with faculty satisfaction, giving particular attention to job satisfaction (the primary performance and well-being indicator used in the present study). It is noted that job satisfaction and dissatisfaction are theoretically and empirically distinct constructs (e.g., Dunnette, Campbell, & Hakel, 1967); however, given their significantly negative relation with each other (Dunnette et al., 1967), studies that measured job dissatisfaction (e.g., depression, burnout) were also included in the present literature review to bolster the predictive utility of the present study’s constructs.

**Upper level administrative support.** Upper level administrative support was operationalized as respondents’ perceptions of the priorities of institutional leadership (i.e., president, provost, or chancellor of the university; dean of the college), as well as how they are communicated and acted upon. This type of operationalization of administrative support has
been used in several faculty satisfaction studies. Previous investigations have found a positive link between perceptions of administrative support and faculty job satisfaction in part-time NTT faculty (Eagan, Jaeger, & Grantham, 2015), full-time NTT faculty (Seipel & Larson, 2018), and tenure track faculty (e.g., Al-Hussami, Saleh, Abdalkader, & Mahadeen, 2011; Bunton et al., 2012; Larson et al., 2017) as well as in samples of mixed NTT and tenure track faculty (Malati, Pratiksha, & Jain, 2012).

**Chair support.** Chair support included perceptions of recognition, fairness, decision-making, priorities, and communication of one’s department head or chair. No NTT studies were located that uniquely measured chair support. Larson et al. (2017) showed chair support to be significantly related to tenure track faculty well-being. In a medical school sample, chair support was significantly related to faculty satisfaction (Chung et al., 2010). Furthermore, a relationship-focused leadership style has also been demonstrated as positively associated with faculty satisfaction (Brown & Moshavi, 2002).

**Institutional support.** Institutional support included respondents’ perceptions of the sufficiency of available university resources. Previous work (Eagan et al., 2015) using an NTT faculty sample, showed lack of office space to be related to job dissatisfaction. In a qualitative study of 104 part-time NTT faculty, lack of clerical/technical support and office space emerged as a theme for part-time NTT faculty (Kezar, 2013a). More broadly, tenure track faculty findings show that concerns regarding physical conditions and working facilities are a significant determinant of faculty job satisfaction (e.g., Larson et al., 2017).

**Contract renewal and promotion clarity.** Contract renewal and promotion clarity involved administrative openness regarding the process of contract renewal and promotion (if applicable) for NTT faculty. It stands out as a particularly unique environmental support for full-time NTT faculty, as they do not have the security of employment that is granted to faculty who have attained tenure. Previous work identified department support, which included contract renewal and promotion clarity, related positively to NTT faculty satisfaction (Seipel & Larson, 2018). “Terms of employment” has also been identified as a theme surrounding the contract
renewal process that was a source of frustration, anxiety, and overall work dissatisfaction in a qualitative study of NTT faculty (Waltman, Bergom, Hollenshead, Miller, & August, 2012). Among tenure track faculty, promotion and tenure support (the closest analogue to the present variable) have directly related to global satisfaction (Adkins, Werbel, & Farh, 2001; Larson et al., 2017).

**Recognition support.** Recognition support included recognition received from colleagues, peers, and superiors for various academic responsibilities including outreach, teaching, advising, scholarly/creative work, and service contributions. Particularly relevant to the current study, one previous investigation used a COACHE subsample of NTT faculty and found that institutional recognition was a significant predictor of satisfaction (Ott & Cisneros, 2015). Additional work has demonstrated that recognition for good work was among the strongest predictors of faculty satisfaction in their combined sample of NTT and tenure track faculty (Leung, Siu, & Spector, 2000). In a tenure track faculty sample, investigators found recognition from departmental colleagues to be the greatest predictor of job satisfaction (Bozeman & Gaughan, 2011).

**Personal and family support.** Personal and family support involved the employee’s perceptions of support from their departmental colleagues and the institution at large in the establishment of balance between their professional and personal life responsibilities. Only two NTT studies examined relevant constructs. Flexibility for personal life as a source of job satisfaction emerged as a theme in an unusually large qualitative study sampling 220 NTT faculty (Waltman et al., 2012). Personal and family supports have also been shown to relate to faculty well-being in an exclusively NTT sample (Seipel & Larson, 2018). Three additional studies that included both NTT and tenure track faculty have shown indicators of well-being were related to constructs similar to personal and family support. One of these investigations found that lower levels of support for non-work-related activity was linked with higher levels of perceived job threat stress ($\beta = -.50, p < .001$); such stress resulted in decreased work well-being ($\beta = -.48, p < .001$) and increased work ill-being ($\beta = .44, p < .001$; Bell, Rajendran, & Theiler,
Another found that faculty spending more versus less time with family had the highest levels of faculty satisfaction (Gabbidon & Higgins, 2012). Further, the third work identified that schedule flexibility and work-family enrichment were important antecedents of job satisfaction (Michel & Michel, 2015). Finally, a similar pattern has been observed among tenure track faculty as family leave has been identified as a critical component of tenure track faculty satisfaction (Gunn, Freund, Kaplan, Raj, & Carr, 2014).

**The Mediators: Volitional Autonomy and Relatedness**

Before examining the empirical evidence concerning the mediating role of volitional autonomy and relatedness in relations between environmental supports and faculty satisfaction, the direct relations of these psychological needs with indices of satisfaction is reviewed. First, a recent meta-analysis showed that volitional autonomy \( (k = 34, N = 12,519, r = .54, p < .05) \) and relatedness \( (k = 34, N = 12,519, r = .42, p < .05) \) each had a positive relationship with job satisfaction in the general working adult population (Van den Broeck, Ferris, Chang, & Rosen, 2016). Additionally, four NTT faculty studies were noteworthy. Relevant to volitional autonomy, lack of choice in courses taught, textbooks, and curricular decisions emerged as a theme (Kezar, 2013a). Relevant to relatedness, lack of perceived respect correlated with work dissatisfaction in one NTT sample (Egan et al., 2015). A qualitative study identified feeling excluded in their departments as a recurring theme among NTT faculty (Waltman et al., 2012). To date, Seipel and Larson (2018) provided the only NTT faculty study that examined volitional autonomy and relatedness as mediators of the relations between environmental supports and NTT faculty satisfaction. A similar investigation using a tenure track sample was also relevant to the present study (Larson et al., 2017).

Among NTT faculty, volitional autonomy fully mediated the relation of administrative support and global satisfaction, and none of their three environmental supports (administrative, departmental, personal and family) had direct effects on either indicator of faculty satisfaction (Seipel & Larson, 2018). In the tenure track faculty sample, volitional autonomy fully mediated the relation of all their environmental supports (administrative, chair, research, department
feedback/support, promotion and tenure) and teaching/service satisfaction while volitional autonomy did not significantly relate to global satisfaction (Larson et al., 2017).

In the NTT study, relatedness fully mediated the relationships between three environmental supports (administrative, departmental, personal and family) and both indices of NTT faculty satisfaction (Seipel & Larson, 2018). Among tenure track faculty, relatedness partially mediated the relationship between four environmental supports (administrative, research, department feedback/support, promotion and tenure) and global satisfaction, one index of faculty satisfaction (Larson et al., 2017). In contrast with the findings of the NTT investigation (Seipel & Larson, 2018), these same four environmental supports also had direct effects on global satisfaction. However, relatedness did not significantly relate to the other index of satisfaction, namely teaching/service satisfaction (Larson et al., 2017).

The findings of both studies (e.g, Larson et al., 2017; Seipel & Larson, 2018) provided preliminary evidence for the efficacy of SDT in mediating the relationships between environmental supports and faculty satisfaction. The current study seeks to further their work by expanding the model forwarded by Larson and colleagues (2017) within a larger, national sample of full-time NTT faculty. Moreover, the previous examination of NTT faculty was limited by a small sample size and only three heterogeneous environmental support variables (Seipel & Larson, 2018). Conversely, the present investigation capitalized on a much larger sample size and included six environmental supports in order to better elucidate the various factors at play within the full-time NTT faculty environment and their relation to NTT faculty satisfaction.

**Hypotheses**

Consistent with the noted sub-theories of SDT, we first hypothesized that the basic psychological needs of volitional autonomy and relatedness would fully mediate the relationships between the six identified environmental supports and the two indices of faculty satisfaction. Second, we expected the fully mediated SDT model depicted in Figure 1 would provide a better fit to the data than an alternative model in which the six environmental support variables served as exogenous variables, both indices of faculty satisfaction served as mediators,
and the SDT needs served as outcome variables. This alternative model was based on the proposition that more support from the academic environment would lead NTT faculty to perceive greater levels of global and teaching satisfaction and would in turn experience greater levels of volitional autonomy and relatedness. The second hypothesis is anchored in both SDT (Deci & Ryan, 1985; Ryan & Deci, 2000) as well as previous investigations into full-time NTT faculty satisfaction (Seipel & Larson, 2018).

Method

Participants

Participants included 3,527 full-time NTT faculty from 28 universities across the United States with the highest Carnegie research classification who responded to Harvard University’s Collaborative on Academic Careers in Higher Education (COACHE) faculty satisfaction survey (Benson et al., 2014). A sample size of 390 (5 participants for each of the 78 parameters) was recommended to provide statistical power sufficient for multivariate modeling (Hatcher, 1994).

Of the 3,527 participants (58.6% female, 41.4% male) included in the analyses, the mean age was 47.2 years (SD = 14.8). The sample was 84.2% Non-Hispanic White, 5.6% Asian, Asian-American, or Pacific Islander, 3.7% Latino/a, 3.6% Black or African-American, 1.3% Multiracial, 0.7% American Indian or Native Alaskan, and 0.8% identified with an unlisted racial identity. The sample was composed of primarily U.S. citizens (93.0%). In terms of academic field, 48.3% held non-STEM (science, technology, engineering, & mathematics) positions (e.g., humanities, social sciences, arts, business, or education), 28.6% occupied appointments in the medical field (e.g., medical or health professions), and 23.1% were in STEM fields (e.g., physical sciences, biological sciences, engineering, or agriculture).

The COACHE

The COACHE faculty satisfaction survey is a web-based assessment administered to university employees. The survey took roughly 25 minutes to complete. Since 2003, the COACHE survey has been administered to more than 250 academic institutions in the U.S (COACHE, 2017). Its primary purposes center on institutional improvement and research
regarding higher education (e.g., Lawrence et al., 2014; Ott & Cisneros, 2015). In addition to
demographic questions, the instrument contains 170 5-point Likert scale items. These items are
grouped by content area into scales referred to by COACHE personnel as “benchmarks.”
However, the benchmarks specified by COACHE do not align with SDT constructs; therefore
prior SDT research (Larson et al, 2017; Seipel & Larson, 2018) generated new scales consistent
with SDT that operationalized environmental supports, SDT needs, and indicators of faculty
satisfaction. Their work involved using the 2013-2014 COACHE survey items from one
university.

The current national archival sample was obtained from the administration of the 2013-
2014 edition of the COACHE survey from the years 2013 through 2016 and was obtained with
permission from Harvard University.

**Upper level administrative support.** This scale (Larson et al., 2017) operationalizes
upper level administrators’ content, consistency, and communication of stated priorities to
faculty and their pace of decision-making. Respondents indicated their agreement with each item
using a 5-point Likert scale, with higher scores indicating more perceived administrative support.
This scale consisted of nine total items, with three concerning the dean’s level, five concerning
the president/chancellor/provost’s level, and one pertaining to both levels. An example item was:
“My institution’s president’s/chancellor’s communication of priorities to faculty.” Larson and
colleagues reported an alpha of .92, and Seipel and Larson (2018) reported an alpha of .93 in
their NTT faculty sample. Cronbach’s $\alpha$ was .92 in this sample. Construct validity estimates were
provided by Larson et al. (2017) as well as Seipel and Larson (2018) to substantiate a unitary
factor structure with loadings from .62 to .81 and .61 to .87, respectively. Moreover, the
construct was distinct from other environmental supports, with correlations ranging from .16 to
.42 (Larson et al., 2017) and .15 to .33 in Seipel and Larson’s (2018) investigation. Convergent
validity estimates reported by Larson et al. show administrative support moderately related to
promotion and tenure support and department feedback/support as expected. Seipel and Larson
(2018) reported correlations of .92 and .89 with COACHE scales identified as senior leadership and division leadership, respectively.

**Chair support.** The chair support scale from Larson et al. (2017) includes five 5-point Likert scale items with higher scores indicative of more department chair support. Item content included perceived fairness, pace of decision-making, stated priorities, and communication of the department chair, as well as recognition received from the chair. An example item stem was: “My department head’s or chair’s fairness in evaluating my work.” Larson and colleagues reported a Cronbach’s $\alpha$ of .94 in their tenure track sample; $\alpha$ was .94 in the current sample. An exploratory factor analysis reported by Larson et al. revealed a unitary factor structure, with loadings from .90 to .96. Moreover, the construct was distinct from other environmental supports, with correlations ranging from .16 to .31 (Larson et al., 2017). Estimates of convergent validity in their sample showed chair support to be strongly related to COACHE’s benchmark for departmental leadership ($r = .94$).

**Institutional support.** This scale is a modification of Larson et al.’s (2017) 13-item research scale operationalizing available university resources. Seven items not relevant to NTT faculty (e.g., institutional support for scholarly work) were omitted in the present study. As such, the current scale included 6 items. Item content included evaluation of classrooms, technical support, research space, office, library resources, and equipment, with higher scores showing more support. An example item was: “Please rate your level of satisfaction with library resources.” Cronbach’s $\alpha$ was .86 in Larson et al.’s (2017) sample and .74 in this sample. Larson et al. reported items loaded on a unitary factor with item loadings from .42 to .65; the construct was unique in that it correlated with other environmental support scales from .26 to .56. It also correlated strongly with the COACHE benchmark for facilities/resources ($r = .82$; Larson et al.). This scale is also comparable to the resources scale used by Ott and Cisneros (2015) and Lawrence et al. (2014), which moderately correlated with job satisfaction and turnover intentions.
**Contract renewal and promotion clarity.** This scale was modified from the Larson et al. (2017) promotion and tenure support scale to be tailored to NTT faculty. It contained ten 5-point Likert items with higher scores indicative of more perceived clarity around the NTT faculty contract renewal and promotion process. Item content concerned the criteria, standards, evaluation, necessary dossier contents, and personal sense of whether one’s contract would be renewed/promoted. An example item for contract renewal was: “Please rate the clarity of the contract renewal process.” The item was worded identically for promotion, only replacing “contract renewal” with “promotion.” Larson et al. presented initial construct validity showing all items loading on a unitary factor with loadings ranging from .87 to .95. They reported an α of .94. Cronbach’s α was .95 in this sample. It was distinct from the other environment support scales in their sample with correlations ranging from .21 to .50. This scale was also embedded in the 19-item Seipel and Larson (2018) departmental support scale; that scale was distinct from the two other environmental support scales (rs = .15, .45; ps < .01) and moderately related to global and teaching satisfaction.

**Recognition support.** The scale from Larson, Shelley, and Gahn (2015) operationalizes perceived departmental recognition for one’s work. Larson et al. (2017) collapsed this scale into their department feedback/support scale. The scale includes four 5-point Likert items with higher scores indicating more perceived recognition. Item content included recognition for teaching efforts, scholarship/creative activities, service, and overall efforts. An example item was: “How satisfied are you with the recognition you received from your colleagues/peers for all your work?” Cronbach’s α was .91, and the unitary factor loadings ranged from .72 to .81 (Larson et al., 2015). Cronbach’s α was .92 in this sample. The construct was not redundant of other environment support variables, with correlations ranging from .35 to .67 (Larson et al., 2015). It also correlated highly (r = .95) with the COACHE benchmark for appreciation and recognition.

**Personal and family supports.** This scale, taken from Seipel and Larson’s (2018) study, contained seven 5-point Likert items assessing one’s perceived ability to find work-life balance as an employee at one’s institution as well as satisfaction with one’s retirement and health
benefits. The item content concerned: the ability to find work-life balance, institutional support in finding work-life balance, the institution’s attempt to make life obligations career-compatible, and retirement and health benefits. An example item was: “I have been able to find the right balance, for me, between my professional life and my personal/family life.” All seven items loaded on a unitary factor, with loadings ranging from .53 to .80 and an $\alpha$ of .82 in Seipel and Larson’s (2018) NTT faculty sample. Cronbach’s $\alpha$ was .78 in this sample. Moreover, the construct was distinct from other environmental supports with correlations ranging from .15 to .33 (Seipel & Larson, 2018). Seipel and Larson’s (2018) initial estimates of convergent validity showed it correlated highly with the COACHE benchmarks for personal and family benefits ($r = .63, p < .01$) and health and retirement benefits ($r = .67, p < .01$).

**Volitional autonomy.** This scale from Seipel and Larson’s (2018) investigation contained six 5-point Likert items with higher scores indicative of greater levels of volitional autonomy. Item content focused on the discretion to choose committees on which to serve, distribution of committee responsibilities, course content discretion, equality of teaching work load, one’s perceived influence in guiding one’s own academic work, faculty input into institutional priorities, and faculty input into departmental policy. An example item stem was: “The discretion you have over the content of the courses you teach.” All items loaded on a unitary factor with loadings ranging from .44 to .70 (Seipel & Larson, 2018). Cronbach’s $\alpha$ was .79 in the Seipel and Larson NTT faculty sample, .75 in Larson et al.’s (2017) tenure track sample, and .79 in this sample.

**Relatedness.** This scale from Larson et al. (2017) and Seipel and Larson (2018) operationalized collegiality and contact/engagement with peers. They expanded upon the collegiality scale from Ott and Cisneros (2015) and Lawrence et al. (2014) to include aspects of relatedness beyond collegiality (e.g., interaction with peers). The scale included 17 five-point Likert items with higher scores indicating more perceived relatedness. Three institution-specific items from Larson et al. (2017) and Seipel and Larson (2018) were not in this current national data set. Item content focused on: amount of professional and personal interaction with other
faculty members across ranks, intellectual vitality of other faculty, productivity of peers, the extent to which faculty members assist each other when needed, perceptions of departmental collegiality, and departmental inclusiveness. An example item was: “How well do you fit in your department? (e.g., your sense of belonging in the department)”. Cronbach’s $\alpha$ was .91 for the current sample, .93 in Seipel and Larson (2018), and .92 in Larson et al. (2017). Construct validity estimates from exploratory factor analyses in both the tenure track sample and the NTT faculty sample yielded a unitary factor with loadings ranging from .38 to .79 and .46 to .78, respectively (Larson et al., 2017; Seipel & Larson, 2018). Seipel and Larson (2018) also found relatedness to be distinct yet moderately correlated with volitional autonomy ($r = .48$) and to fully mediate the relation between their three environment supports and global satisfaction. The similar scale, collegiality, was also shown to relate to turnover intentions, and it differentiated Asian international faculty who intended to stay from those who intended to leave (Lawrence et al., 2014). NTT faculty also reported significantly less collegiality than tenure track faculty (Ott & Cisneros, 2015).

**Teaching and service satisfaction.** The teaching/service satisfaction scale from Larson et al. (2017) and Seipel and Larson (2018) was used. This scale contained six 5-point Likert scale items with high scores indicating higher levels of satisfaction within one’s teaching and institutional service roles. Items focused on number of courses taught, the level of courses taught, average class size, quality of students, and the number of committees served. An example item was: “The quality of students you teach, on average.” Cronbach’s $\alpha$ was .75 in Larson et al., .72 in Seipel and Larson, and .73 in the current sample. Regarding construct validity, both studies presented evidence of a unitary factor structure with loading ranging from .40 to .66 (Larson et al., 2017) and .38 to .74 (Seipel & Larson, 2018). Both Seipel and Larson (2018) as well as Larson and colleagues (2017) also showed that teaching/service satisfaction correlated .45 and .25, respectively, with global satisfaction, suggesting the two scales capture distinct constructs. Moreover, they both provided estimates of convergent validity, showing it strongly
related to the COACHE benchmark Nature of Work-Teaching in the NTT faculty sample \( (r = .88) \) and in the tenure track sample \( (r = .81) \).

**Global satisfaction.** The global satisfaction scale from Seipel and Larson (2018) consisted of four 5-point Likert items capturing overall job satisfaction with higher scores representing greater levels of satisfaction. Specifically, item content included the decision to work at the current institution, the department as a place to work, the institution as a place to work, and recommendation to potential incoming faculty. An example item was: “If I had it to do all over, I would again choose to work at this institution.” Coefficient \( \alpha \) was .93 in Seipel and Larson (2018) and .88 in the present sample. Seipel and Larson (2018) also provided evidence of construct validity, showing that the items loaded onto a unitary factor with loadings ranging from .81 to .91. As mentioned earlier, Seipel and Larson (2018) also demonstrated it to be distinct from teaching/service satisfaction. Moreover, although no COACHE benchmarks measure global satisfaction, Seipel and Larson (2018) did show that this scale highly correlated with the 1-item global satisfaction measure used by both Lawrence and colleagues (2014) as well as Ott and Cisneros (2015), with respective correlations of .92 and .91.

**Procedure**

The archival data set was obtained from COACHE. It was an archival faculty satisfaction survey that had been administered at 28 colleges and universities across the United States during 2013 – 2016. During that time, full-time faculty (both tenure track and NTT) were invited by their Provost’s office to complete the survey. All full-time faculty who were not hired during the same academic year as the administration of the survey were invited to respond. During the three academic years from fall 2013 to spring 2016, 11,306 full-time tenure track and full-time NTT faculty members responded to the survey. Because all data received from COACHE were de-identified, approval was not required from the authors’ Institutional Review Board.

**Results**

**Data Cleaning**
**Quality check.** Participants who completed the survey in an unusual amount of time (more than 2 SD below the mode) and respondents who used an identical pattern of response throughout the survey were removed by COACHE staff prior to the authors receiving the data. This resulted in an initial sample size of 4,317 full-time NTT faculty. Using the guidelines for dealing with missing data issued by Schlomer, Bauman, and Card (2010), we removed items in which there were extensive missing data. Next, participants who had extensive missing data (more than 20%) were removed ($n = 741$).

**Univariate and multivariate outliers.** Next, we examined z-scores for each scale to check for univariate outliers (i.e., z-score greater than 3.29 or less than -3.29) and Mahalanobis distances among scale scores to check for multivariate outliers (Tabachnick & Fidell, 2001). In the current sample, 29 cases were outliers at the univariate level and 20 cases were outliers at the multivariate level ($p < .001$). These cases were dropped, yielding a final sample size of 3,527.

**Missing Data.** For the final sample of 3,527 participants, rates of missing data for the conceptual items ranged from 0.001% to 11.1%. Little’s (1988) missing completely at random (MCAR) test was conducted to examine for patterns of missingness in the conceptual scale scores. The result suggested that missing data points were not randomly distributed among scale scores, $\chi^2(339, N = 3,527) = 439.58, p < .001$. To examine for selection bias among the missing, dummy variables were coded to indicate whether participants had a valid or missing response for each predictor variable in the model, and $t$-tests were conducted to assess whether scores on each outcome variable were significantly different between participants with a valid versus missing response on any of the predictor variables. Using a Bonferroni correction ($p < .003$), none of the $t$-tests were significant which suggests the data were still missing at random (MAR) and that maximum likelihood estimation would provide an unbiased estimation of parameters for missing values as recommended by Schlomer and colleagues (2010).

Means, standard deviations, and zero-order correlations between each observed variable are included in Table 1.

**Structural Equation Modeling**
Structural equation modeling (SEM) was conducted using Mplus 7.4 (Muthén & Muthén, 2012) to examine the relationships between each of the six environmental support indices, volitional autonomy, relatedness, and both indices of NTT faculty satisfaction. Robust maximum likelihood (MLR) estimation was used to correct for multivariate non-normality and impute missing data. Kolmogorov-Smirnov tests of univariate normality for each variable using SPSS version 25 indicated that all variables violated the assumption of univariate normality (ps < .001), thus preventing multivariate normality. Accordingly, models were estimated using a Satorra-Bentler corrected $\chi^2$ statistic that is robust to non-normality (Satorra & Bentler, 2001). In addition, goodness of fit of all models was assessed using guidelines forwarded by Hu and Bentler (1999): a comparative fit index (CFI) of .95 or greater, a root-mean-square error of approximation (RMSEA) of .06 or less, and a standardized root-mean-square residual (SRMR) of .08 or less.

**Latent exogenous variables.** Three parcels or sets of observed indicators were used to estimate the six environmental support exogenous variables. While some debate exists regarding the use of parcels in SEM, Russel and colleagues (1998) argue in favor of the use of parcels for three reasons. First, parcels help to address nonnormality of individual items. Second, parcels decrease the number of parameters present in the analyses. Third, parcels decrease the likelihood that unique aspects of individual items may affect model outcomes.

For the current study, we followed the procedural recommendations of Russell and colleagues (1998) and created parcels by conducting factor analyses for each variable using the maximum likelihood method and fitting to a one factor solution. Items with the highest factor loadings were parceled into pairs with items with the lowest factor loadings resulting in an equal average loading for each parcel.

**Measurement model.** First, we tested a measurement model to assess how well the parcels represented the latent variables. With the exception of the significant $\chi^2$ ($\chi^2 [360, N = 3527] = 4143.80, p < .001$) which is sensitive to sample size, fit indices suggested a good fit to the data, CFI = .95, RMSEA = .060, (90% CI = [.050, .060]), SRMR = .04. Further, parcels
demonstrated significant factor loadings on their latent variables with standardized betas ranging from .59-.97 at \( p < .001 \). Zero-order latent variable correlations were all significant \( (p < .001) \). As expected, correlations were all positive and ranged from .40 to .87.

**Structural model.** Subsequently, we examined the fully mediated structural model wherein upper level administrative support, chair support, recognition support, contract renewal and promotion clarity, personal and family support, and institutional support were included as exogenous variables, volitional autonomy and relatedness were included as mediators, while teaching/service satisfaction and global satisfaction were held as endogenous variables. Again, with the exception of the significant scaled \( \chi^2 \) (scaled \( \chi^2 (372, N = 3527) = 4743.29, p < .001 \)), all other fit indices indicated an adequate fit to the data, CFI = .94, RMSEA = .058, (90% CI = [.056, .059]), SRMR = .04. The model with standardized beta coefficients is shown in Figure 2.

Consistent with hypothesis 1 and SDT, the fully mediated model using volitional autonomy and relatedness as mediators between the environmental support variables and NTT faculty satisfaction was supported by the data. As expected, upper level administrative support, chair support, institutional support, recognition support, and personal and family support were associated with greater volitional autonomy. However, contract renewal and promotion clarity did not significantly relate to volitional autonomy. Volitional autonomy was associated with increased teaching/service satisfaction and global satisfaction among NTT faculty.

Further, chair support, institutional support, contract renewal and promotion clarity, recognition support, and personal and family support were associated with increased relatedness. Upper level administrative support, however, was not significantly associated with relatedness. Relatedness was positively associated with global satisfaction but was surprisingly unrelated to teaching/service satisfaction among NTT faculty as shown in Figure 2.

Next, the alternative structural model was examined in which the six environmental supports again served as exogenous variables, while both indices of faculty satisfaction served as mediators, and both volitional autonomy and relatedness served as the outcome variables. It
yielded a worse fit by all indices (scaled $\chi^2 (372, N = 3527) = 5261.95, p < .001$; $CFI = .93$, $RMSEA = .06$, (90% CI = [.060, .063]), $SRMR = .05$), supporting the second hypothesis.

**Indirect effects.** Mean indirect effects of the hypothesized model were evaluated using bootstrap tests with bias corrected 95% confidence intervals. Because the hypothesized model was fully mediated by volitional autonomy and relatedness, all relationships between environmental support indices and faculty satisfaction were fully mediated. The bootstrap process repeated with 1,000 samples to provide parameter estimates for each indirect effect. Indirect effects significant across all samples were evidenced by a 95% confidence interval that did not contain 0 ($p < .05$). Table 2 presents the magnitude and statistical significance of the indirect effects of environmental supports on the outcome variables through volitional autonomy followed by relatedness.

Volitional autonomy served as a significant mediator between 5 of the 6 environmental supports (i.e., upper level administrative support, chair support, institutional support, recognition support, and personal and family support) and both teaching/service satisfaction and global satisfaction. Relatedness significantly mediated the relationships between 5 of 6 environmental supports (i.e., chair support, institutional support, contract renewal and promotion clarity, recognition support, and personal and family support) and global satisfaction. However, relatedness was not significantly associated with teaching/service satisfaction and thus did not serve as a mediator between the environmental supports and the teaching/service index of faculty satisfaction.

**Discussion**

Consistent with the hypothesized model, volitional autonomy fully mediated the relationships between the environmental supports and both indices of faculty satisfaction while relatedness mediated the relationships between the environmental supports and global satisfaction. Specifically, the faculty supports were the upper level administration, the chair, and the institution broadly, as well as clarity regarding contract renewal and promotion, recognition, and acknowledgement of personal and family concerns. These results support SDT’s assertion
that basic psychological need satisfaction explains the relationship between supports in a specific environment and individuals’ satisfaction in that context. Moreover, these results support Seipel and Larson’s (2018) NTT findings that autonomy and relatedness combined fully explain the link between their environmental supports and faculty well-being. These findings are also consistent with Larson et al.’s (2017) examination of a tenure track sample specific to one indicator of faculty well-being, namely teaching/service satisfaction. Specifically, Larson et al. showed volitional autonomy (and perceived competence which was not measured in the current study) fully mediated the relationships between five faculty supports and teaching/service satisfaction. Across these three studies, there is strong evidence that SDT as a framework can explain previous findings reporting various significant relationships between faculty supports and faculty satisfaction (e.g., Chung et al., 2010; Eagen et al, 2015; Kezar, 2013a; Ott and Cisneros; Waltman, et al., 2012).

Consistent with the second hypothesis, examination of the fit indices indicated that the SDT-based hypothesized model which used the basic psychological needs as mediators was a better fit to the data than the alternative model positing that the indices of faculty satisfaction mediated the relationship between the environmental supports and the basic psychological needs. This finding further supports the use of the basic psychological needs as mediators of the relationship between the work environment and job satisfaction among full-time NTT faculty as posited by the self-determination sub-theories (Deci & Ryan, 1985; Deci & Ryan, 2014; Ryan & Deci, 2002).

Beyond the general findings, specific findings are important in extending this literature both for researchers and faculty administrators allocating resources. Volitional autonomy and relatedness yielded important differential results. First, volitional autonomy predicted both indicators of faculty satisfaction in this full-time NTT sample. Volitional autonomy did not have significant paths to either indicator of faculty well-being in Seipel and Larson’s (2018) NTT sample. However, Seipel and Larson’s (2018) small sample size ($N = 96$) may have prevented the paths from volitional autonomy to teaching/service satisfaction ($\beta = .20$) and to global
satisfaction (β = .19) from reaching significance. That is, smaller sample sizes may be more susceptible to Type 2 error. Moreover, because path analysis does not remove error variance from the model, their path coefficients would be somewhat smaller than the path coefficients in the structural equation modeling (SEM) used in the current study. In Larson et al.’s (2017) study of tenure track faculty, volitional autonomy significantly predicted only global satisfaction. Volitional autonomy may function differently as a mediator for full-time NTT faculty in comparison to tenure track faculty. For example, NTT faculty may see volitional autonomy as mostly revolving around teaching responsibilities (e.g., choosing which courses to teach, which textbooks to use, curricular requirements) while tenure track faculty may see volitional autonomy as focusing more on choice of research topics and how that research is conducted.

Relatedness in the current sample significantly predicted global satisfaction but not teaching/service satisfaction. These results parallel the findings reported by Larson et al. (2017) in their tenure track sample. This may mean that the sense of belonging or connection to other people at work may lead to overall faculty satisfaction but not specifically to satisfaction with one’s teaching or service roles. Such findings seem intuitive in that teaching represents a more solitary pursuit (i.e., it is not a peer-to-peer interaction), and satisfaction with service may hinge on workload rather than relationships with colleagues. These results are also consistent with Eagen et al.’s (2015) results showing a link between relatedness and overall satisfaction. It must be pointed out the path from relatedness to teaching and service satisfaction was significant in Seipel and Larson (2018). Considering the large sample size in the current study and similar findings with the large tenure track sample, it may be that the link between relatedness and teaching/service satisfaction will be absent in future studies. However, future researchers can continue to explore the extent to which relatedness contributes to teaching/service satisfaction.

Using SEM, the combined faculty supports, with the exception of contract renewal and promotion clarity, explained 91% of volitional autonomy in this national full-time NTT sample. These results support the findings of Larson et al. (2017) using a tenure track sample in that all environmental supports were significantly predictive of volitional autonomy, explaining 59% of
the variance in their path analysis. However, this finding is inconsistent with Seipel and Larson’s (2018) NTT result in which only 19% of volitional autonomy was explained in their path analysis and only upper level administrative support was a significant predictor. Given the small size of Seipel and Larson’s sample, the reader can have some confidence that in both NTT and tenure track faculty, multiple faculty supports contribute to volitional autonomy.

The faculty supports combined, with the exception of upper level administrative support, explained 54% of the variance in relatedness in this SEM analysis. These results are consistent with Seipel and Larson’s (2018) finding using an NTT sample that all three of their faculty supports contributed to explaining 42% of the variance in relatedness. Likewise, these results are mostly consistent with those of Larson et al. (2017) showing that department feedback/support (including recognition) was conducive to fostering relatedness. However, in their sample of tenure track faculty, chair support did not significantly predict relatedness. These findings may suggest that department chairs are uniquely positioned to influence relatedness in NTT faculty but less positioned to influence relatedness in tenure track faculty. As the most proximal leaders to NTT faculty, department chairs seem most capable of influencing relatedness by creating a welcoming and inclusive environment. The findings across all three studies also distinguish chair support from recognition support. Recognition support was predictive of relatedness in all three studies (recognition was included in the departmental support construct in both Seipel & Larson, 2018 and Larson et al., 2017). In short, recognition from one’s peers for job performance appears to be a potent way of conveying a sense of belonging and community among both NTT and tenure track faculty. These results are also consistent with other studies showing similar support for recognition contributing to faculty satisfaction in NTT faculty (Ott & Cisneros, 2015) and tenure track faculty (Leung et al., 2000). This study extends those prior findings by identifying relatedness as a mediator in this relationship.

Limitations

First, the current data set was cross-sectional. Changes over time could not be calculated, and causal links between environmental supports, psychological needs, and indices of NTT
faculty satisfaction could not be established. Second, the examination of academic area was beyond the scope of this paper; therefore generalizations about particular academic disciplines are not appropriate. Third, some of scales used in the current model had internal consistency levels below .80, calling into question the validity of these scales. However, the use of SEM allowed for the error variance embedded in all measures to be removed during analysis, largely alleviating this concern. Fourth, a number of variables that may moderate the proposed model of full-time NTT faculty satisfaction were not taken into account. Variables such as years in position and expectations for transitioning to a tenure track position may, at various points in one’s career, impact faculty satisfaction. Fifth, the current sample was drawn from research universities and may not be representative of faculty from other institutions where goals and performance expectations may differ. Sixth, the current sample included only full-time NTT faculty, and the resulting model may not generalize to part-time or adjunct NTT faculty. Finally, the third basic psychological need, perceived competence, was not included in the present model and may provide additional information about the NTT faculty experience.

Implications and Future Directions

As NTT faculty hires become more prevalent within higher education, institutional administrators’ understanding of the factors that govern NTT faculty satisfaction becomes paramount to university success. The current study identified salient environmental supports (i.e., upper level administration, the department chair, the institution, as well as clarity regarding contract renewal and promotion, recognition from peers, and support for personal and family needs) that played a role in predicting faculty satisfaction through their positive relations with volitional autonomy and/or relatedness. For example, these findings suggests that department chairs, through volitional autonomy and relatedness, play a crucial role in fostering an academic environment in which NTT faculty experience satisfaction. As the institutional leader with the most control over NTT faculty’s daily work experience, department chairs must be mindful of their impact on their subordinates and act to promote a cohesive and self-directed working environment if their goal is to enhance well-being within the department.
Further, the current model demonstrates the effectiveness of SDT needs in promoting particular aspects of full-time NTT faculty satisfaction. Because global and teaching/service satisfaction were predicted by volitional autonomy, university leadership may examine opportunities for NTT faculty to govern their own work responsibilities when making policy decisions aimed at fostering the NTT faculty experience.

Future investigations must expand the current findings by examining model fit within racial/ethnic subsamples in order to substantiate the validity of the posited model. Perceived competence should also be included in future investigations to obtain a complete understanding of SDT’s ability to mediate the relationship between the environment and NTT faculty satisfaction. In addition, future investigations should incorporate measures of internalized motivation in the present model to better understand the mechanism through which basic psychological needs enhance NTT faculty satisfaction. Current results could also be furthered by including additional environmental support indices capturing constructs such as mentorship and student interaction. As researchers continue to explore the current model, SDT remains a viable frame for understanding the NTT faculty experience in order to enhance higher education at large.
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Table 1
Mean, Standard Deviations, and Correlations of Environmental Supports, Psychological Needs, and Indices of Faculty Satisfaction

<table>
<thead>
<tr>
<th>Index</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
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<tbody>
<tr>
<td>1. Upper level administrative support</td>
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<td>.41</td>
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<td>4. Contract renewal and promotion clarity</td>
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<td>.47</td>
<td>.37</td>
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<td>5. Recognition support</td>
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<td>.58</td>
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<td>6. Personal &amp; family support</td>
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<td>.46</td>
<td>.53</td>
<td>.39</td>
<td>.54</td>
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<td>7. Volitional autonomy</td>
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<td>.72</td>
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<td>.60</td>
<td>.55</td>
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<td>8. Relatedness</td>
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<td>.57</td>
<td>.45</td>
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<td>.62</td>
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<td>9. Teaching &amp; service satisfaction</td>
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<td>.37</td>
<td>.48</td>
<td>.33</td>
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<td>.51</td>
<td>.62</td>
<td>.44</td>
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<tr>
<td>10. Global satisfaction</td>
<td>.53</td>
<td>.63</td>
<td>.53</td>
<td>.46</td>
<td>.63</td>
<td>.62</td>
<td>.66</td>
<td>.65</td>
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</table>

**Mean**

|      | 3.25 | 3.70 | 3.68 | 3.12 | 3.34 | 3.73 | 3.49 | 3.78 | 3.78 | 3.89 |

**Standard Deviation**

|              | 0.85 | 1.07 | 0.71 | 1.10 | 0.92 | 0.72 | 0.77 | 0.66 | 0.64 | 0.97 |

*Note. N = 3,527. All variables are scored 1 to 5 on Likert scales, with higher scores indicating a greater degree of the construct. All correlations greater than .06 are significant at \( p < .001 \). Items 1-6 are environmental supports, items 7-8 are psychological needs, and items 9-10 are indices of faculty satisfaction.*
### Table 2

*Bootstrap Analysis of Magnitude and Statistical Significance of Indirect Effects of Environmental Supports on Faculty Satisfaction through the Psychological Needs*

<table>
<thead>
<tr>
<th>Indirect Effects</th>
<th>β and product</th>
<th>Mean Indirect Effect (b)</th>
<th>SE of Mean</th>
<th>95% BC CI Lower, Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a. Upper level administrative support</td>
<td>Volitional autonomy</td>
<td>Teaching and service satisfaction</td>
<td>(.21) X (.71) = .15</td>
<td>.10</td>
</tr>
<tr>
<td>1b. Chair support</td>
<td>Volitional autonomy</td>
<td>Teaching and service satisfaction</td>
<td>(.42) X (.71) = .30</td>
<td>.16</td>
</tr>
<tr>
<td>1c. Institutional support</td>
<td>Volitional autonomy</td>
<td>Teaching and service satisfaction</td>
<td>(.23) X (.71) = .16</td>
<td>.12</td>
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<tr>
<td>1d. Contract renewal and promotion clarity</td>
<td>Volitional autonomy</td>
<td>Teaching and service satisfaction</td>
<td>(.01) X (.71) = .01</td>
<td>.01</td>
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<tr>
<td>1e. Recognition support</td>
<td>Volitional autonomy</td>
<td>Teaching and service satisfaction</td>
<td>(.12) X (.71) = .09</td>
<td>.06</td>
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<tr>
<td>1f. Personal and family support</td>
<td>Volitional autonomy</td>
<td>Teaching and service satisfaction</td>
<td>(.21) X (.71) = .15</td>
<td>.13</td>
</tr>
<tr>
<td>2a. Upper level administrative support</td>
<td>Relatedness</td>
<td>Teaching and service satisfaction</td>
<td>(.001) X (.03) = .00003</td>
<td>.00</td>
</tr>
<tr>
<td>2b. Chair support</td>
<td>Relatedness</td>
<td>Teaching and service satisfaction</td>
<td>(.23) X (.03) = .007</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>2c. Institutional support</td>
<td>Relatedness</td>
<td>Teaching and service satisfaction</td>
<td>(.12) X (.03) = .004</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>2d. Contract renewal and promotion clarity</td>
<td>Relatedness</td>
<td>Teaching and service satisfaction</td>
<td>(.07) X (.03) = .002</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>2e. Recognition support</td>
<td>Relatedness</td>
<td>Teaching and service satisfaction</td>
<td>(.31) X (.03) = .009</td>
<td>.01</td>
</tr>
</tbody>
</table>
### NTT Faculty Satisfaction

| 2f. Personal and family support | Relatedness | Teaching and service satisfaction | \((.15) \times (.03) = .005\) | <.01 | <.01 | -.004, .012 |
| 3a. Upper level administrative support | Volitional autonomy | Global satisfaction | \((.21) \times (.72) = .15\) | .17 | .01 | .140, .191* |
| 3b. Chair support | Volitional autonomy | Global satisfaction | \((.42) \times (.72) = .30\) | .27 | .02 | .239, .298* |
| 3c. Institutional support | Volitional autonomy | Global satisfaction | \((.23) \times (.72) = .17\) | .21 | .02 | .173, .256* |
| 3d. Contract renewal and promotion clarity | Volitional autonomy | Global satisfaction | \((.01) \times (.72) = .007\) | .01 | .01 | -.007, .026 |
| 3e. Recognition support | Volitional autonomy | Global satisfaction | \((.12) \times (.72) = .09\) | .10 | .02 | .063, .129* |
| 3f. Personal and family support | Volitional autonomy | Global satisfaction | \((.21) \times (.72) = .15\) | .22 | .03 | .173, .271* |
| 4a. Upper level administrative support | Relatedness | Global satisfaction | \((.001) \times (.20) = .0002\) | .00 | <.01 | -.008, .008 |
| 4b. Chair support | Relatedness | Global satisfaction | \((.23) \times (.20) = .05\) | .04 | .01 | .031, .055* |
| 4c. Institutional support | Relatedness | Global satisfaction | \((.12) \times (.20) = .02\) | .03 | .01 | .016, .049* |
| 4d. Contract renewal and promotion clarity | Relatedness | Global satisfaction | \((.07) \times (.20) = .01\) | .01 | <.01 | .007, .020* |
| 4e. Recognition support | Relatedness | Global satisfaction | \((.31) \times (.20) = .06\) | .07 | .01 | .049, .093* |
| 4f. Personal and family support | Relatedness | Global satisfaction | \((.15) \times (.20) = .03\) | .04 | .01 | .025, .067* |

**Note.** \(N = 3,527\). BC CI = Bias-Corrected Confidence Interval. *These values are based on the unstandardized path coefficients. *95% Confidence interval does not include zero and therefore is significant at \(p < .05\).
Figure 1. Hypothesized full mediation model.

Note. Correlations were specified among the exogenous variables, among the two mediators, and among the two outcome variables but are omitted for visual clarity.
Figure 2. Structural equation modeling results.

Note. All paths shown were significant at $p < .05$ with the exception of upper level administrative support to relatedness, contract renewal and promotion clarity to volitional autonomy, and relatedness to teaching & service satisfaction. Correlations were specified among the exogenous variables, among the two mediators, and among the two outcome variables but are omitted for visual clarity.