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Exploring the Social-Environmental Determinants of Well- and Ill-Being in Dancers: A Test of Basic Needs Theory

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Grounded in the basic needs mini-theory (Deci & Ryan, 2000), this study examined the interplay among perceptions of the social environment manifested in vocational dance schools, basic need satisfaction, and indices of elite dancers' well- and ill-being. The hypothesized mediating role of need satisfaction was also tested. Dancers (N = 392) completed a questionnaire tapping the targeted variables. Structural equation modeling supported a model in which perceptions of task-involving dance environments positively predicted need satisfaction. Perceived ego-involving climates negatively corresponded with competence and relatedness. Perceptions of autonomy support were positively related to autonomy and relatedness. Need satisfaction positively predicted positive affect. Competence and relatedness satisfaction corresponded negatively to reported negative affect. Emotional and physical exhaustion was not related to need satisfaction. Partial support emerged for the assumed mediation of the needs. Results highlight the relevance of task-involving and autonomy-supportive dance climates for elite dancers' need satisfaction and healthful engagement in vocational dance.

Keywords: autonomy support, motivational climate, need satisfaction, well-being

The potential psychological benefits linked with sport involvement are well documented. Research evidence suggests sport participation to be an antecedent of emotional well-being (Steptoe & Butler, 1996) and reduced anxiety and depression (Vilhjalmsson & Thorlindsson, 1992). It has been recognized, however, that sport engagement is not always health conducive, and the variability in the health-related consequences of sport is dependent on social-environmental factors and motivational processes (Reinboth, Duda, & Ntoumanis, 2004).

In dance, research attention frequently highlights the potential physical and psychological costs of involvement. Studies point to the prevalence of health problems such as eating disorders (Smolak, Murnen, & Ruble, 2000) and injuries (Bowling, 1989) among members of the professional and student dance communities. Previous research has also implicated aspects of the social environment in dance classes in the manifestation of compromised health in dancers (Thomas, Keel, &

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Heatherton, 2005). However, the literature pointing to implications of the social context for dancers' well- and ill-being tends to be more anecdotal than evidence based (Segal, 2001). Moreover, the mechanisms by which the social environment may influence dancers' welfare remain largely unexplored.

Self-determination theory (SDT; Deci & Ryan, 1985, 2000) has become a popular framework within which to examine the social-environmental and motivation-related correlates of positive as well as maladaptive engagement in physical activities. Self-determination theory regards social-environmental conditions as fundamental to the progression or attenuation of self-motivated actions, and health via the satisfaction or thwarting of three psychological needs (Ryan, 1995). In recent years, the physical activity literature has begun to focus on the role of these basic psychological needs in the interplay between contextual features and well- and ill-being reported by participants in these settings. This emerging literature has centered on sport (Amorose & Anderson-Butcher, 2007; Reinboth & Duda, 2006), exercise (Edmunds, Ntoumanis, & Duda, 2006; Wilson & Rodgers, 2004), and physical education (Standage, Duda, & Ntoumanis, 2005). If tested within dance, SDT could lead to a greater insight into not only if, but also *how* dance environments may lead to the maladaptive consequences for dancers that have been frequently documented. This represents an important extension of the literature.

Basic Needs Theory

Basic needs theory (BNT), a mini-theory of the SDT framework (Deci & Ryan, 1985, 2000), proposes the nurturing of innate psychological needs—namely, competence, autonomy, and relatedness—to be fundamental to optimal human functioning (Ryan, 1995). Deci and Ryan (2000) consider these needs as "innate psychological nutriments that are essential for ongoing psychological growth, integrity, and well-being" (p. 229). When the need for competence is satisfied, one feels efficacious and able to successfully carry out the actions that he or she so desires (White, 1959). Autonomy is satiated when individuals consider themselves to be the initiators of their decisions and that they behave in a way that reflects their true aims and choices (Deci & Ryan, 1985). The need for relatedness corresponds with a feeling that one is understood by, cared for, and connected with other individuals (Baumeister & Leary, 1995).

A central tenet of BNT is that satisfaction of the three basic needs is necessary for mental health and adaptive engagement regardless of cultural differences or contextual variability (Deci & Ryan, 2000). Recent research points to the prevalence of psychological and other health-related problems among full-time professional and student dance artists (Laws, 2005). To date, there is limited evidence concerning determinants of healthful dance engagement and the predictors or consequences of satisfaction of the needs for autonomy, competence, and relatedness in the vocational dance context are unknown. Thus, BNT-grounded research in dance is warranted.

The Social Context and Need Satisfaction

Self-determination theory assumes that characteristics of the social environment are critical to the level of need satisfaction that individuals experience and their resultant cognitive, behavioral, and affective responses (Amorose, 2007; Deci &

Ryan, 2000). One dimension of the social environment that has received theoretical and empirical attention is autonomy support. Autonomy support is evident when a leader readily involves the other in decisions, reduces pressures, takes his or her perspective, and provides opportunities for choice (Black & Deci, 2000). Studies in mainstream education (Black & Deci, 2000), physical education (Standage, Duda, & Ntoumanis, 2003), and sport (Adie, Duda, & Ntoumanis, 2008) have illustrated the benefits that ensue when teachers and coaches are perceived to be autonomy supportive. In autonomy-supportive environments, students and athletes are more likely to report higher need satisfaction; more autonomous reasons for engagement; and more positive emotional, cognitive, and behavioral consequences.

Pulling from achievement goal theory (Ames, 1992; Nicholls, 1989), a few studies have examined variation in the perceived motivational climate as another social-environmental feature relevant to the differential satisfaction of the basic needs. The term *perceived motivational climate* refers to the goal structures that individuals recognize to be accentuated within an achievement setting that are relevant to competence-centered activities (Duda, 2001). Two dimensions of the climate have been identified that are assumed to hold implications for whether a person is more or less task and/or ego involved in that context. In a climate that is more task involving, performance-related progress tends to be judged by self-referenced standards, and choice, cooperative and peer learning, and individual effort are emphasized. Environments described as more ego involving are characterized by social comparison, punishment for mistakes, and the encouragement of intraindividual rivalry (Ames, 1992; Newton, Duda, & Yin, 2000). Benefits that have been associated with perceptions of task-involving climates include greater self-determined motivation for engagement among physical education students (Standage et al., 2003) and more positive affective states (Standage, Duda, & Pensgaard, 2005). Conversely, perceived ego-involving environments have been found to be detrimental for healthful sport engagement (Duda, 2001). For example, performance-related anxiety and worry, body concerns, and low self-esteem have all been associated with perceptions of an ego-involving sport environment (Duda, 2001; Duda & Balaguer, 2007).

Past work has also indicated that sport climates characterized by more task-involving and less ego-involving features correspond to enhanced need satisfaction in athletes (Reinboth & Duda, 2006). There is an inherent logic undergirding these findings. Perceptions of competence may profit in task-involving climates, as self-referenced criteria for competence construal is emphasized. Such criteria can be considered to be more personally controllable than when judgment regarding one's competence is primarily tied to normative comparisons (which tend to be emphasized in ego-involving climates). Thus, task-involving climates should contribute toward a sense of autonomy (Duda, 2001). Ego-involving climates are marked by intraindividual competition and rivalry among participants (Newton et al., 2000). Subsequently, feelings of relatedness may be threatened in such an environment (Reinboth & Duda, 2006). On the other hand, task-involving climates are often marked by an emphasis on peer learning and cooperation. In such settings, one would expect participants to feel more connected and valued. Thus, need satisfaction may represent a psychological mechanism by which variability in perceptions of the motivational climate corresponds to differences in the physical and psychological health status of those engaged in the particular context.

In research involving dance students, Carr and Wyon (2003) found perceptions of ego-involving dance environments to be associated with maladaptive psychological attributes, including neurotic perfectionism and trait anxiety. This study was the first to document a relationship between perceptions of the motivational climate in vocational dance settings and the compromised welfare of dancers. However, the Carr and Wyon research did not consider the psychological processes underlying the observed relationships between the perceived motivational climate operating and the targeted negative indicators of dancers' emotional welfare.

In a recent study of dancers in hip-hop companies, Quested and Duda (2009b) provided some preliminary evidence of the role of basic needs in the interplay between the perceived motivational climate and the reported degree of well- and ill-being experienced by dancers. Specifically, they found hip-hop dancers' perceptions of task-involving climates to positively predict satisfaction of the needs for autonomy, competence, and relatedness. Perceptions of an ego-involving climate significantly and negatively predicted relatedness. Competence was found to mediate the associations between dancers' perceptions of the task-involving features of the dance climate and their experiences of positive and negative affective states.

The present study aims to replicate and extend our findings as presented in Quested and Duda (2009b). In that initial work, we recruited a small sample (N = 59) of dancers who were engaged in hip-hop dance on a part-time basis (M = 16.72 and SD = 12.34 hr dancing per week). In the present research, we were interested in examining the interrelationships between perceptions of the motivational climate as well as degree of autonomy support provided, need satisfaction, and indices of well- and ill-being among a large sample of full-time vocational ballet and contemporary dance students. Dancers training in vocational schools are engaged in dance classes and other physical training activities for five or six full days per week. These students often live, as well as study and dance, at their vocational dance school. Therefore, the degree of exposure to the social environment manifested in the dance setting, as well as the nature of the dance experience per se, differs for the current study participants when contrasted with what was the case for the hip-hop dancers (Quested & Duda, 2009b).

Need Satisfaction and Well- and Ill-being

The majority of studies grounded in BNT (Deci & Ryan, 2000) have considered needs as potential contributors to indicators of well-being. According to Ryan and Deci (2000b), the deprivation of psychological needs represents "a principle source of human distress" (p. 74). Therefore, it seems pertinent to consider markers of both well- *and* ill-being when evaluating the role of variation in basic need satisfaction with regard to optimal functioning. In the present work, we examined whether the three needs were independently associated with indicators of dancers' well-being (positive affect) *and* state of ill-being (negative affect and emotional and physical exhaustion). We selected these particular indices of well- and ill-being for a number of reasons. First, our study (Quested & Duda, 2009b) that we are replicating and extending centered on the prediction of ratings of emotional and physical exhaustion, and positive and negative affect in the hip-hop dancers sampled. Further, well-being has been defined as not merely the presence of positive psychological states and absence of negative psychological states, but also held to capture

whether an individual feels "well," both emotionally and physically (Caspersen, Powell, & Merritt, 1994). Previous investigations have highlighted the prevalence of emotional problems and feelings of exhaustion among those in the vocational dance milieu (Laws, 2005). Thus, we considered examining the determinants of positive and negative affect, as well as emotional and physical exhaustion, among the present sample of vocational dancers to be a worthy pursuit.

A few recent sport studies have tested and provided support for the "environment–needs–motivation–well-being" sequence central to SDT (Ryan & Deci, 2007). However, Deci and Ryan (2000) have argued that a direct relationship between the needs and markers of well-being must exist if the constructs are to be considered as "needs" rather than "desires." The premise that basic needs mediate the relationship between perceptions of the motivational climate and experiences of well- and ill-being (Gagne & Blanchard, 2007) remains an SDT supposition that is more often assumed than rigorously tested. In past work testing the hypothesized meditational role of need satisfaction (Quested & Duda, 2009b; Reinboth & Duda, 2006), multiple regression has been the chosen method as opposed to alternative statistical methods (i.e., structural equation modeling) that control for measurement error. In studies that have employed more sophisticated analytic techniques, a composite variable has been employed to represent the three needs as a mediator (Standage, Duda, & Ntoumanis, 2005) or perceived autonomy support was the lone social-environmental variable under scrutiny (Adie et al., 2008).

In sum, the major aim of this study was to test the motivational sequence proposed by BNT in a sample of vocational dance students. Specifically, we were interested in examining the social-environmental and psychological antecedents of dancers' well-being (positive affect) and ill-being (negative affect and emotional and physical exhaustion). The second key objective was to test the assumed mediating role of each basic need in the hypothesized "motivational climate–well-/ill-being" relationships via an analytic strategy that takes into account measurement error. Structural equation modeling was employed to test the hypothesized mediation of autonomy, competence, and relatedness in the relationship between perceptions of the autonomy-supportive and task- and ego-involving features of the dance environment and dancers' reported negative affect, emotional and physical exhaustion, and positive affect. It was hypothesized that perceptions of autonomy support and a task-involving climate would positively, and perceptions of an ego-involving climate would negatively, predict satisfaction of the three needs. Need satisfaction was anticipated to be positively associated with positive affect and negatively linked to negative affect and emotional and physical exhaustion. In accordance with BNT (Deci & Ryan, 2000), the three needs were expected to fully mediate the relationships between perceptions of the autonomy-supportive and task- and ego-involving features of the dance climate and the outcome variables of interest in this study.

Method

Participants and Procedures

Ethical approval was garnered from a departmental ethics board at a large university in the United Kingdom. Participants were 392 dancers (96 male, 293 female, 3 gender unspecified; *M* age = 18.67 years, *SD* = 2.26) currently engaged in full-time

vocational training in the United Kingdom. The gender skew evident in this sample is typical of the population being targeted. In terms of ethnic background, 58.6% of the sample reported being white British, 19.1% were white–other, 4% reported having a mixed background, 5.6% were Asian, 1.1% were black, and 11.6% did not report their ethnic/racial background. Dancers stated that they had been dancing for an average of 12.12 (SD = 4.27) years and spent 31.9 (SD = 10.17) hours dancing per week.

School directors were contacted in advance and the purposes of the research were explained. Consent forms and information sheets were completed and returned by all dancers and parents of dancers that were under 16 years of age. Data collection took place in classrooms or dance studios at specifically scheduled times during the school day. The principle investigator administered a multisection questionnaire, and dancers were asked to complete the questionnaire without conferring with their fellow dancers. It was made clear to all dancers attending these sessions that completion of the questionnaire was a voluntary undertaking. No dancers declined to participate. Dancers were informed that there were no right or wrong answers and that their responses would remain confidential.

Measures

Perceived Autonomy Support. The dancers' perceptions of autonomy support provided in the dance schools were tapped via seven items (adapted for dance settings) from the Health Care Climate Questionnaire (HCCQ; Williams, Grow, Freedman, Ryan, & Deci, 1996). Items (e.g., "I feel that my teachers provide me with choices and options") following the stem "In this dance school . . ." were rated on a scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Previous studies in sport settings have supported the reliability and validity of the seven-item version of this scale (Adie et al., 2008; Reinboth et al., 2004).

Perceptions of the Motivational Climate. The 33-item Perceived Motivational Climate in Sport Questionnaire-2 (PMCSQ-2; Newton et al., 2000) was employed to assess dancers' evaluations of the prevailing motivational climate operating in their dance schools. The questionnaire wording was modified accordingly. Dancers were asked to consider the typical atmosphere manifested "in this dance school. . . ." Perceptions of the task-involving features of the climate were tapped with items including "trying hard is rewarded in rehearsals and performances" and "each dancer contributes in some important way." Items gauging a perceived ego-involving climate included "the teachers have their own favorites" and "if you want to be cast for the best roles you must be one of the best dancers." The questionnaire employs a Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Previous studies conducted in sport and other physical activities have supported the reliability and factorial validity of the PMCSQ-2 (Newton et al., 2000). Evidence for the internal reliability of the scale has also been garnered in the dance domain (Carr & Wyon, 2003; Quested & Duda, 2009b).

Basic Need Satisfaction. Satisfaction of the need for relatedness was tapped by the five-item acceptance subscale of the Need for Relatedness Scale (Richer & Vallerand, 1998). Items including "valued" and "supported" followed the stem "In this dance school I feel. . . ." The questionnaire employs a scale of 1 (*strongly*

disagree) to 5 (*strongly agree*). The five-item perceived competence subscale of the Intrinsic Motivation Inventory (McAuley, Duncan, & Tammen, 1989) was employed to assess dancers' satisfaction of the need for competence. Items were gauged on a scale of 1 (*strongly disagree*) to 7 (*strongly agree*). Exemplar items include "I am pretty skilled at dance" and "I am satisfied with my dancing." Autonomy was tapped via three items (Sheldon, Elliot, Kim, & Kasser, 2001) assessing the extent to which the dancer feels she or he has an internal perceived locus of control in regard to dance engagement. The stem "In this dance school I feel . . ." was followed by such items as "that my choices express my 'true self' / who I really am." The scale utilizes a Likert scale ranging from 1 (*not at all true*) to 5 (*very much*). The internal reliability of all the scales tapping need satisfaction have been supported in previous research involving dancers (Quested & Duda, 2009b).

Well-Being/Ill-Being Indicators. The extent to which dancers were experiencing positive affect (e.g., "interested") and negative affect (e.g., "guilty") was tapped via the Positive and Negative Affect Scale (PANAS; Watson, Clark, & Tellegen, 1988). Dancers were asked to consider if they "generally feel" this way when responding to the items. A Likert scale ranging from 1 (*not at all)* to 5 (*extremely*) accompanies the 20 items. Previous studies in sport settings have supported the psychometric attributes of the PANAS (Crocker, 1997). Emotional and physical exhaustion experienced by the dancers was assessed using the five-item emotional and physical exhaustion subscale from the Athlete Burnout Questionnaire (Raedeke & Smith, 2001). A scale of 1 (*almost never*) to 5 (*almost always*) accompanied items including "I am exhausted by the mental and physical demands of dance." The validity of this scale has been supported in studies conducted in physical activity contexts (Raedeke & Smith, 2001). The internal reliability of these scales was supported in previous research involving elite hip-hop dancers (Quested & Duda, 2009b).

Data Analysis

Data were analyzed via structural equation modeling with maximum likelihood estimations. All analyses were carried out in version 16 of the AMOS software (Arbuckle, 1999). In line with the frequently advocated two-step approach to structural equation modeling (Kline, 2005), the first stage of the procedure was to check the factor structure of each questionnaire and the overall measurement model. Once these were deemed acceptable, the second step was to test whether the data provided an adequate fit to our hypothesized model.

There are several options for determining the degree of model fit (Hu & Bentler, 1999). A nonsignificant χ^2 is considered to indicate that the data fits the model adequately. The χ^2 is known to be affected by sample size (Arbuckle, 1999; Hu & Bentler, 1999). Therefore, absolute and incremental fit indices were our primary consideration when determining whether the hypothesized model accurately represented the data. The standardized root mean square residual (SRMR) and the root mean square error of approximation (RMSEA) were chosen as indicators of absolute fit. Values ≤ .08 and .06 (respectively) advocate a model with good fit to the data (Hu & Bentler, 1999). The comparative fit index (CFI) and the Tucker–Lewis index (TLI) were considered as incremental fit indices. Values >.90 indicate

adequate model fit. However, values > .95 are considered as the benchmark for models with excellent fit (Hu & Bentler, 1999).

The procedural recommendations of Baron and Kenny (1986) have been a popular approach to test mediation (Baron & Kenny, 1986). However, it has been argued that Baron and Kenny's causal steps method of testing mediation merely probes, rather than fully explicates, the relationship of an independent variable to a dependent via intervening variables (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). This method has also been criticized on account of low statistical power (MacKinnon et al., 2002) and limited application to multiple mediation models. Specifically, it is not possible to tease out the independent intervening effect of each mediator via the casual steps method. This approach does not calculate an estimate of the indirect effects or standard errors that would enable statistical significance of the indirect effects to be ascertained (MacKinnon & Fairchild, 2009; Preacher & Hayes, 2008).

It is possible to assess the significance of each mediator by examining the joint significance of the coefficients that contribute to each mediation effect (MacKinnon, et al., 2002). Via a multiple mediator model, we adopted a two-step approach to test the mediating role of the three psychological needs. First, we determined whether there was evidence of mediation in our hypothesized model, via the nested model strategy (Holmbeck, 1997). This approach determines whether there is evidence of an overall indirect effect. To explicitly ascertain the magnitude and significance of the specific mediated effects via each of the three needs, we followed the recommendations of MacKinnon (2000) in our second step of mediation analysis. Specifically, we examined the indirect effect of perceptions of autonomy support and task and ego climates on each dependent variable via each need, and also tested the significance of the joint coefficients of each mediation effect (MacKinnon, 2000).

Results

Table 1 presents descriptive statistics and alpha reliability coefficients for, and intercorrelations between, all of the measures employed in this study. Typically, dancers considered their motivational climate to be relatively high in autonomy support, as well as task- and ego-involving features. On average, the dancers' needs for autonomy, competence, and relatedness were moderately satisfied. Overall, dancers reported more positive affect than negative affect and moderate emotional and physical exhaustion.

The construct validity of each scale was examined using confirmatory factor analysis (CFA). The CFA for a model representing the PMCSQ-2 (specifying the first- and second-order factors of this questionnaire) revealed poor fit to the data, $\chi^2(488) = 1263.21$, $p < .01$; CFI = .84; RMSEA = .07; TLI = .83; SRMR = .09. The modification indices provided by AMOS were examined alongside consideration of the applicability of the troublesome items to the dance context. When deemed statistically acceptable and domain appropriate, problematic items were removed in a step-by-step fashion and model fit improved.[1] Along with conceptual reasoning, modifications of this nature have been justified because resultant models are derived from the best-performing indicators without sacrificing the hypothesized model structure (Hofmann, 1995). The other measures used in the study demonstrated acceptable construct validity.[2]

Table 1 Descriptive Statistics, Cronbach's Alpha Coefficients for, and Correlations Between, the Observed Subscale Scores

Variable	*M*	*SD*	α	1	2	3	4	5	6	7	8
(1) Autonomy support (1–7)	4.43	1.19	.89	—							
(2) Ego-involving climate (1–5)	3.37	.67	.90	–.43**	—						
(3) Task-involving climate (1–5)	3.86	.54	.87	.59**	–.30*	—					
(4) Autonomy (1–5)	3.13	.85	.74	.51**	–.32*	.44*	—				
(5) Competence (1–7)	4.61	1.02	.85	.23*	–.23*	.31*	.33*	—			
(6) Relatedness (1–5)	3.45	.89	.87	.71**	–.48*	.59*	.50*	.36*	—		
(7) Positive affect (1–5)	3.73	.62	.86	.43**	–.25*	.41*	.38*	.42*	.47*	—	
(8) Negative affect (1–5)	2.40	.72	.84	–.25**	.33*	–.29*	–.24*	–.39*	–.35*	–.28*	—
(9) Exhaustion (1–5)	3.23	.92	.90	–.22**	.21*	–.14*	–.22*	–.18*	–.21*	–.27*	.32*

*$p < .01$, **$p < .001$.

To increase the stability of the parameter estimates and improve the ratio of variable to sample size (Little, Cunningham, Shahar, & Widaman, 2002), construct-specific parcels were created for the PMCSQ-2 and the PANAS scales. Items from each scale were randomly assigned (to two- or three-item parcels in the case of the measure of autonomy support and the PANAS, and four-item parcels in the case of the PMCSQ-2) and employed as indicators for each factor. Items that were eliminated on account of poor loading in scale-specific CFAs were not included in the parceling procedure. In this study, our predictions regarding the dancers' perceptions of the motivational climate were based on the higher-order dimensions of the motivational climate (Ames, 1992). We did not set out to differentiate between the second-order characteristics of the climate captured within these higher dimensions. Therefore, we created parcels from the PMCSQ-2 items by parceling items with other items that represented the same higher-order factor (i.e., task-climate items were parceled with other task-climate items; ego-climate items were paired with other-ego climate items).

The measurement model was tested to evaluate whether the parceled indicators loaded onto their respective latent constructs. A satisfactory fit was evident, $\chi^2(534) = 1092.12$, $p < .001$; CFI = .95; RMSEA = .04; TLI = .94; SRMR = .05. The data in the measurement model did not display multivariate normality (Mardia's multivariate kurtosis = 127.21). Therefore, the bootstrapping technique was employed in all further structural equation modeling analyses. Bootstrapping is a statistical resampling technique that treats the data as a pseudo-population and simulates the drawing of multiple samples from the targeted population (Kline, 2005). This enables parameter distributions to be estimated for each sample redrawn, which cumulatively provide a bootstrap sampling distribution (Bryne, 2001). The calculation of model statistics, parameters, and standard errors are derived from the bootstrap sample distribution.

The hypothesized structural model was specified in accordance with the tenets of BNT (Deci & Ryan, 2000). An inherent assumption of BNT is that the three needs are interrelated (Ryan & Deci, 2000b). Given that latent endogenous variables cannot be linked in structural equation modeling, their associated error terms were allowed to correlate to reflect this theoretical supposition. This approach has been adopted in previous research (Reinboth et al., 2004; Sheldon & Bettencourt, 2002; Standage et al., 2003).

The structural model demonstrated a reasonable fit to the data, $\chi^2(641) = 1142.38$, $p < .001$; CFI = .94; RMSEA = .05; TLI = .94; SRMR = .06. Significant path coefficients are presented in Figure 1. All hypothesized paths predicting autonomy, competence, and relatedness were significant, except for the paths between perceptions of autonomy support and competence, and between perceptions of ego-involving dance climates and autonomy. Contrary to our hypotheses, there were no significant paths between the three needs and emotional and physical exhaustion. In addition, autonomy need satisfaction did not significantly predict the dancers' reported negative affective states. Nonsignificant paths in the model were between autonomy support and competence ($\beta = -.029$, $p = .70$), ego climates and autonomy ($\beta = -.09$, $p = .22$), autonomy and negative affect ($\beta = -.02$, $p = .89$), as well as between autonomy ($\beta = -.18$, $p = .11$), competence ($\beta = -.07$, $p = .28$), and relatedness ($\beta = -.12$, $p = .23$) and emotional and physical exhaustion.

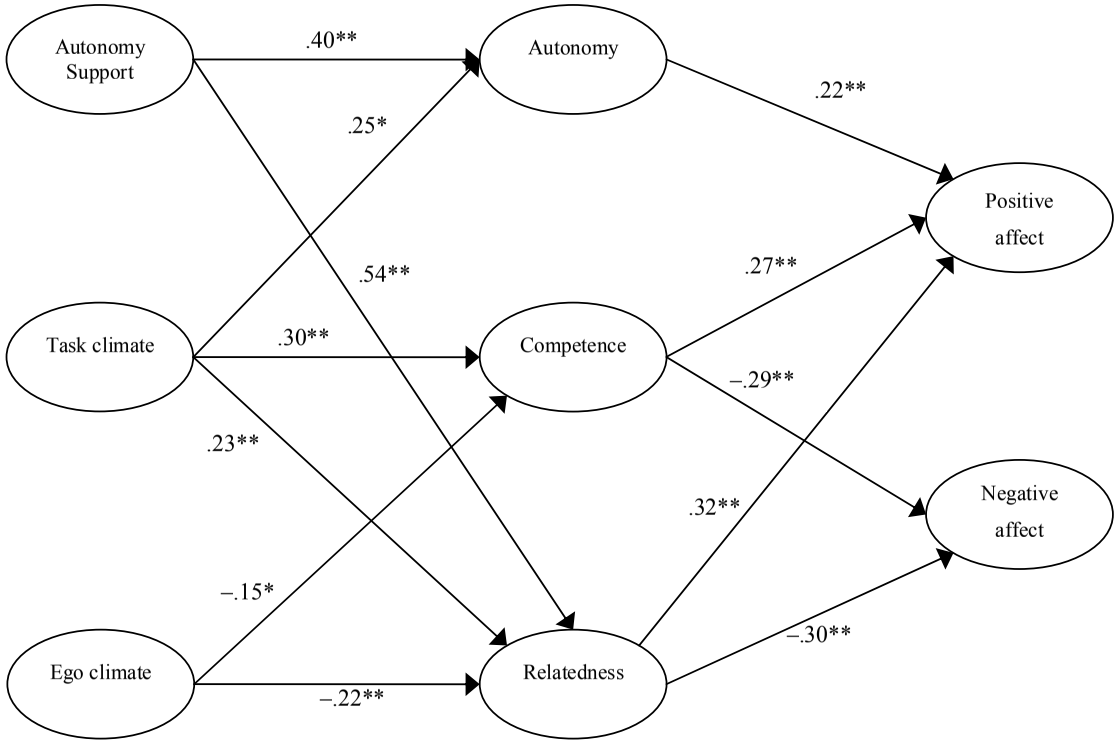

Figure 1 — The structural model of the interrelationships between dancers' perceptions of the social environment, need satisfaction, affective states and emotional and physical exhaustion. *Note*. All coefficients presented are standardized and significant (*$p < .05$, **$p < .01$). There were no significant paths to emotional and physical exhaustion. Therefore, this latent variable is not represented in the model. For visual simplicity, variances are not presented but all were significant ($p < .01$).

The percentage of variance (based on squared multiple correlations) accounted for in each mediator and dependent variable were as follows: Autonomy: 40%, competence: 13%, relatedness: .70%, exhaustion: 9%, positive affect: 41%, negative affect 25%. All R^2 were statistically significant ($p < .01$). Correlations in the model were as follows: Task climate–ego climate = –.35, autonomy support–task climates = .63, autonomy support and ego climates = –.48. Correlations between disturbance terms in the model were as follows: Autonomy–competence = .22, competence–relatedness = .20, autonomy–relatedness = .18.

Testing Mediation

A direct effects model, specifying direct associations between the independent variables (perceptions of autonomy support and task- and ego-involving climates) and the dependent variables demonstrated an acceptable fit to the data, $\chi^2(263) = 486.83$, $p < .001$; CFI = .96; RMSEA = .05; TLI = .95; SRMR =.07. Path coefficients are presented in Table 2. The dancers' perceptions of autonomy support did not significantly predict their reported emotional and physical exhaustion or negative affect. Further, perceptions of ego-involving climates were not significantly associated with the dancers' positive affect, and the direct path between perceptions of task-involving climates and emotional and physical exhaustion was also not significant. If the independent variable does not predict the criterion, the mediator cannot be said to account for this association (Holmbeck, 1997). Thus, while there may still be evidence of an indirect effect, a condition required for tests of mediation per se has been violated.[3] According to Holmbeck (1997), significant paths should be evident between the independent variables and the mediators and the mediators and the outcome variables in a constrained model. This condition was satisfied in

Table 2 Direct and Indirect Effects via Each Need Between Each Independent and Criterion Variable Pairing

			Indirect Effect		
Independent Variable	Criterion	Direct Effect	Autonomy	Competence	Relatedness
Task-Involving	Positive affect	.24**	0.05*[a]	0.08*[a]	0.07*[a]
Climates	Negative affect	–.25**	–0.01	–0.09*[a]	–0.07*[a]
	Exhaustion	–.01	–0.04	–0.02	–0.03
Ego-Involving	Positive affect	–.09	–0.02*	–0.04*	–0.07*
Climates	Negative affect	.32**	0.002	0.04*	0.07*
	Exhaustion	.18*	0.02	0.01	0.03
Autonomy Support	Positive affect	.29**	0.09*[a]	–0.01	0.17*[a]
	Negative affect	.03	–0.01	0.01	–0.16*
	Exhaustion	–.14	–0.07	0.002	–0.06

Note. Standardized beta coefficients are presented.
*The indirect effect was statistically significant ($z < 1.96$).
[a]Denotes a relationship in which there was evidence of mediation, according to Holmbeck's criteria.

all relationships represented in Figure 1. Finally, one must ascertain the fit of an unconstrained model (i.e., paths between the independent variables and dependent variables are also estimated in the model). This model demonstrated an acceptable fit, $\chi^2(632) = 1119.38$, $p < .01$; CFI = .94; RMSEA = .05; TLI = .94; SRMR = .06. It is noteworthy that in this model, perceptions of an ego-involving environment remained a significant predictor of emotional and physical exhaustion ($\beta = .18$, $p = .048$) and negative affect ($\beta = .25$, $p < .01$), despite the inclusion of the three needs in this model. This defies the possibility of mediation via the three needs with respect to the relationships between perceptions of ego-involving dance climates and emotional and physical exhaustion and negative affect.

According to Holmbeck (1997), there would be evidence of the needs fulfilling a mediating role if the unconstrained model does not offer an advanced representation of the data to that of the constrained model. In this case, the chi-square difference test indicated that the unconstrained model offered a superior fit to the data over that of the constrained model (χ^2 difference = 23.002, *df* difference = 9, $p < .01$). However, the application of the chi-square difference test for determining mediation has been criticized on account of the fact that it only tests for complete mediation (Preacher & Hayes, 2008). Thus, we determined the significance of the indirect effects in the model (see MacKinnon, 2000, for details of the method employed to test significance). Table 2 presents the indirect effects via each mediator for all independent variable–criterion pairings. There were differences in the magnitude of the indirect effects through each need.

Discussion

Grounded in BNT (Deci & Ryan, 2000) and extending previous research, this study determined the interrelationships between dancers' perceptions of the task- and ego-involving and autonomy-supportive features of their dance schools, need satisfaction, and indices of ill- and well-being. Testing the hypothesized mediating role of the basic needs in the theoretical sequence assumed in BNT was also a focus of our investigation. Overall, the study partially supported the tenets of BNT in the vocational dance context.

Perceptions of Social-Environmental Features and Dancers' Need Satisfaction

In line with our hypotheses, dancers' perceptions of task-involving climates positively predicted satisfaction of each of the three basic needs. The observed associations between perceived task-involving cues and fulfillment of the need for competence and autonomy are consistent with previous research in sport (Reinboth & Duda, 2006) and dance (Quested & Duda, 2009b) and, in the case of competence, physical education (Ntoumanis, 2001). The provision of opportunities to experience mastery (Ames, 1992; Duda, 2001), as well as the promotion of self-referenced criteria for gauging success, are features endemic to task-involving environments (Nicholls, 1989). Dancers who perceive their climate to be high in these characteristics may feel more in control of their learning, less threatened by the evaluation process, and more proficient as their judgments of competence are

more self-referenced (Ames, 1992). Thus, competence and autonomy would be expected to be promoted in a more task-involving dance context.

The dancers' perceptions of autonomy support significantly and positively predicted autonomy and relatedness satisfaction. In line with past work in sport (Adie et al., 2008), the strongest relationship was evident for relatedness need satisfaction. As anticipated, perceptions of task-and ego-involving dance climates positively and negatively (respectively) predicted the dancers' reported feelings of relatedness. Aligned with the findings of Quested and Duda (2009b) in the case of hip-hop dancers, the strength of the relationships between perceived task- and ego-involving climates and vocational dancers' sense of relatedness exceeded the observed links between this environmental dimension and the other basic needs. In previous research in physical education, perceived ego-involving features of the setting were unrelated to the physical education students' basic need satisfaction (Standage et al., 2003). In the athletic milieu, support for the association between perceptions of ego-involving climates and relatedness satisfaction has been weak (Reinboth & Duda, 2006). In explicating these differential findings, it is important to note that the dancers in this study reported that they spent between 30 and 50 hr per week dancing in their vocational schools. In contrast, physical education students and athletes involved in university sport and recreational clubs would most likely be engaged in the activity in question for a far smaller proportion of their waking hours. That is, it may be the case that the amount of time one spends in a setting may moderate the relative contribution of ego-involving environments to the individuals' sense of belongingness. Present findings suggest that the prevalence of autonomy-supportive and ego-involving characteristics of the vocational dance context may be particularly important to whether dancers feel allied to or alienated from their fellow dancers and teachers.

Consistent with our hypotheses, perceptions of an ego-involving dance climate negatively predicted dancers' reported competence. When dancers perceive their training environment to be high in ego-involving cues, one might expect their sense of competence to be fragile. This is because in an ego-involving atmosphere, individuals are led to focus on demonstrating superior ability that is normatively defined, and thus, less within their perceived control than self-referenced competence. It is therefore unsurprising that such a motivational atmosphere was associated with diminished perceived competence in the current study. Previous research in sport (Reinboth & Duda, 2006), physical education (Standage et al., 2003), and dance (Quested & Duda, 2009b) has failed to support a negative relationship between perceptions of an ego-involving climate and participants' degree of competence. The disparity between these and our present findings is intriguing; it would appear contradictory to the tenets of BNT (Deci & Ryan, 2000) if the associations between perceptions of ego-involving environments and compromised athlete health (Duda, 2001) were not mediated by this basic need. An inspection of the mean scores in the aforementioned studies suggests ego-involving cues to be equally pronounced in vocational dance contexts (M = 3.37, SD = .67) and physical education classes (M = 3.45, SD = 0.49), but less so in sport settings (M = 2.42, SD = 0.47). However, there may be inherent differences in the specific features of ego-involving climates that are more or less prominent in dance schools as opposed to physical education and sport settings. For example, in a vocational dance setting, dancers regularly perform in front of peers and

teachers, thus prompting daily overt evaluations of the dance students' progress and capability. However, in contrast to sport and physical education, these public displays of the dancers' movement and artistic ability are nearly always subjectively judged; the nature of dance is such that objective indicators of progress are not as salient or readily available as in most sports (e.g., measures of runners' speeds or soccer players' shot accuracy) or in physical education (where the focus is often on objective markers of fitness, physical abilities, or sport skills). Thus, the lack of objective indicators of ability and predominance of subjective, public evaluations may exacerbate the influence of ego-involving features of the climate on dancers' perceptions of competence. Moreover, as argued above, it is also possible that the amount of time one spends in an environment perceived as more ego involving moderates the effect of this climate upon competence need satisfaction.

In line with the aforementioned studies, however (Quested & Duda, 2009b; Reinboth & Duda, 2006; Standage, et al., 2003), perceptions of an ego-involving climate were unrelated to the dancer's reported autonomy in our structural model. Nevertheless, it should be noted that the observed simple correlation coefficient supported the hypothesized negative association between perceptions of ego-involving dance climates and autonomy need satisfaction. When explicating the nonsignificant path between perceptions of ego-involving dance climates and autonomy need satisfaction, it is important to keep in mind that the social-environmental dimensions assessed in this study were interrelated. The observed moderate negative association between perceived task- and ego-involving climates ($R = -.35$) reflects a consistent finding in the literature (Newton et al., 2000). Thus, it is possible that the expected association between a perceived ego-involving dance climate and autonomy was captured within this shared variance (because a significant path between perceptions of a task-involving dance environment and autonomy need satisfaction was observed).

Need Satisfaction and Dancers' Reported Well- and Ill-Being

In past work, need satisfaction during training has been found to positively predict changes in gymnasts' reported well-being (Gagne, Ryan, & Bargmann, 2003), as well as adaptive outcomes in physical education students (Standage, Duda, & Ntoumanis, 2005). Inclusion of the three needs as independent mediators within one model has enabled us to delineate the role of each need as a predictor of the targeted indices of well- and ill-being. Providing support for BNT, dancers' reported positive affect was significantly predicted by satisfaction of all three needs. Competence and relatedness need satisfaction were negatively linked to dancers' negative affect. In previous studies, competence has been identified as the most salient need in the prediction of emotional responses of athletes (Reinboth et al., 2004) and hip-hop dancers (Quested & Duda, 2009b).This pattern of findings may be attributed to the functional significance of feeling competent in the physical domain (Reinboth et al., 2004). Vocational dancers also operate in a context where one's degree of capability is publicly displayed on a daily basis. Thus, perceptions of competence are very relevant in the vocational dance setting too. However, contrary to past research in elite hip-hop dance contexts (Quested & Duda, 2009b) and sport settings (Reinboth et al., 2004), relatedness emerged as the strongest predictor of the targeted indices of well- and ill-being in this present study of young vocational dancers.

Relatedness has been suggested to play a more distal role with regard to psychological growth and development (Deci & Ryan, 2000). In explicating the apparent disparate finding between the results reported in Quested and Duda (2009b) and the present results, it is important to keep in mind that many dancers in the vocational schools sampled had left their homes and/or home countries for the first time to pursue their training. It is therefore conceivable that a sense of relatedness with those in their new prevailing social environment would be strongly associated with the affective states experienced by these young people. The high number of hours dancers spend in school with their fellow dance students and teachers may contribute toward the significance of feeling connected and cared for in this context.

The observed significant paths between relatedness and competence to the degree of negative affect reported by the dancers support the tenets of BNT regarding the assumed role of the needs in the manifestation of ill-being (Gagne & Blanchard, 2007). However, the absence of a negative association between autonomy and negative affect was counter to theoretical predictions. This absence may be attributed to the dancers' expectations regarding the degree of autonomy they would be afforded in training. Historically, the teachers of some dance genres (in particular, ballet) have been considered as highly authoritarian, providing limited autonomy support to their pupils (Aalten, 2005). If a more controlling teaching style typifies the dancers' past and potentially current experiences, it is plausible that being deprived of autonomy would not necessarily correspond to negative emotions (at least in a "one slice in time" study). That is not to say that dancers do not have a need to feel autonomous, or indeed that they can be "fully functioning" in the absence of autonomy. Self-determination theory holds that autonomy deprivation will halt the extent to which dancers can experience optimal growth (Ryan & Deci, 2006). However, if low autonomy has become "normalized" in dance settings—in cross-sectional studies at least—the relationship of low autonomy satisfaction upon negative affective states may be attenuated. Longitudinal research (and, of course, intervention studies) would be important to further understand the potential influence of deprived or promoted autonomy on dancers' experiences of negative emotions. It is also possible, in explicating the nonsignificant link between autonomy and negative affect, that autonomy must be directly thwarted rather than merely "not satisfied" to induce negative feelings (Ryan & Deci, 2000a). Our measure of autonomy centered on the degree of need satisfaction and not how much one's need for autonomy is thwarted.

Contrary to our hypotheses, but complementing the findings of past research (Hodge, Lonsdale, & Ng, 2008; Lonsdale, Hodge, & Rose, 2009; Quested & Duda, 2009b), autonomy, competence, and relatedness needs satisfaction were unrelated to the dancers' reported emotional and physical exhaustion. These results challenge the tenets of BNT that posit the synergistic satisfaction of needs as necessary to avoid compromised physical and psychological health (Deci & Ryan, 2000). It is possible that the expected associations between need satisfaction and emotional and physical exhaustion were compromised by measurement limitations. In the current study and previous work in sport and dance (Adie et al., 2008; Hodge et al., 2008; Lonsdale et al., 2009; Quested & Duda, 2009b), reported emotional *and* physical exhaustion have been measured by the same scale. When these two manifestations of feeling exhausted are assessed together, it is not possible to delineate the specific predictors of emotional tiredness and physical fatigue as separate states. Although

clearly interrelated, it is plausible that motivation-related processes may be more relevant to emotional exhaustion, whereas other variables (e.g., hours of physical training, injury status, quality of sleep) may contribute more substantially to the experience of physical exhaustion. This line of thought gains further credence when it is considered that in other work (Reinboth et al., 2004), physical symptoms (e.g., coughs, sore throats) reported by athletes were unrelated to satisfaction of the needs for autonomy or relatedness. In line with Reinboth and Duda (2006), it might be the case that psychological needs are stronger predictors of indicators of psychological or emotional ill-being than physical ill health (which is not to say that need satisfaction is not relevant to variability in physical health status). Supporting this argument, previous research has indicated that motivational *and* physiological processes contribute to athlete burnout (Lemyre, Roberts, Treasure, Stray-Gundersen, & Matt, 2004). Burnout is understood to represent a syndrome characterized by a reduced sense of athletic accomplishment and depersonalization as well as emotional and physical exhaustion (Raedeke, 1997).

Taken in their totality, the results of the mediation analyses offer partial support for BNT (Deci & Ryan, 2000). Evidence of mediation was most compelling with regard to prediction of the dancers' positive affective states. It is important to note, however, that mediation is a specific type of indirect effect. In the current study, a number of significant indirect effects emerged via the three needs (see Table 2). Our research entailed the testing of a complex model, including multiple predictors, mediators, and endogenous variables. Given that the three needs were significantly interrelated in the model, the indirect effects reported reflect only the *unique* mediating effect via each need. Effects through each mediator in a multiple mediation model are not equivalent to what they would be when tested alone (Preacher & Hayes, 2008). Collectively, these points may explain why there is less evidence of significant mediating effects in the current research than in previous studies that employed less sophisticated tests of mediation (e.g., Reinboth & Duda, 2006).

It is also important to point out that the present findings suggest the associations between the social-environmental features tapped in this study and the targeted indicators of dancers' well- and ill-being may be mediated by other variables not examined in the present research. With respect to the observed direct link between perceptions of an ego-involving dance climate and dancers' reported emotional and physical exhaustion specifically, further research may delineate alternative psychological and/or biological mechanisms via which this facet of the dance environment may be detrimental to dancers' welfare.

Conclusions and Future Directions

This investigation highlights the value of SDT, and in particular the BNT framework (Deci & Ryan, 2000), in the understanding of healthy engagement in dance. From a theoretical standpoint, the current study points to the value of considering autonomy-supportive facets of the teaching environment alongside the task- and ego-involving features when testing the BNT framework in achievement settings. Although significant interrelationships were observed between the two dimensions of the motivational climate and perceived autonomy support (i.e., autonomy support and task-involving climate $R^2 = .40$, autonomy support and ego-involving climate $R^2 = -.23$), the results indicated that these environmental characteristics are not

redundant. The significant paths between the targeted social-environmental factors and the three needs (presented in Figure 1) reinforce the point that these aspects of the perceived environment made distinctive contributions to the prediction of the dancers' autonomy and relatedness. Moreover, in the direct effects model, both task-involving *and* autonomy-supportive features of the dance climate significantly predicted the dancers' reported positive affective states. These findings suggest that these two positive dimensions of the dance climate seem to work in common but also capture unique variance in basic need satisfaction and positive affect.

On the contrary, however, the present findings are less telling regarding the social-environmental predictors of the assessed indices of dancers' ill-being. Perhaps other components of the social environment are more relevant to the manifestation of the dancers' ill-health. It is possible that indices of ill-being would be better accounted for if perceptions of a controlling environment (Amorose, 2007) were included alongside perceptions of autonomy support as well as the perceived positive and potentially negative aspects of the motivational climate in the model.

The relative infancy of research concerning social-psychological correlates of dancers' health is reflected in the paucity of theoretically based but also dance-specific measures of the relevant social-environmental characteristics. In this study we had to adapt, to vocational schools, measures of the social environment that have been developed for use in other contexts (i.e., the PMCSQ-2, Newton et al., 2000, and the HCCQ, Williams et al., 1996). The psychometric properties of the adapted HCCQ were good. However, there were some psychometric problems with the modified version of the PMCSQ-2. Some items from the PMCSQ-2 loaded poorly onto their intended factor and had to be excluded from our analyses. The latter results limit the extent to which our findings can be generalized. The emerging field of dance psychology would benefit from the development of dance-specific measures of the social environment (Quested & Duda, 2009a).

Future research might also consider monitoring daily within- and between-person variability in dancers' perceptions of the social environment, need satisfaction, and indices of well- and ill-being via a diary methodology (Gagne et al., 2003). In such a study, dancers could complete the relevant measures before and after different classes (e.g., contemporary versus ballet) on a daily basis for a period of time. This would help to delineate predictors of day-to-day variability in well- and ill-being, and also allow for the examination of class- and potentially school-level effects. Incorporating markers of metabolic and immunological functioning (Lemyre et al., 2004), alongside self-report measures of health status (i.e., well- and ill-being), would also advance our understanding of the role of basic needs in the manifestation of physical and psychological health in dance settings, as well as other physical activity contexts.

Notes

1. The following two items, intended to capture perceptions of "intra–team member rivalry," loaded onto other factors: "Dancers are encouraged to outperform the other dancers" and "Dancers are "fired up" (positively excited) when they perform better than their fellow dancers in a performance." It is conceivable that these items were problematic because dancers found it difficult

to identify an emphasis on "outperforming." In dance, quantitative indicators of performance are not as apparent as they are in sport settings (where one can refer to scores, speeds, heights, and distances to judge performance relative to others). Given that intrateam rivalry may also be less relevant to student dancers than to sports team members, this dimension was removed. Two other items also cross-loaded. These items—"The teachers think that only the lead dancers contribute to the success of a performance" and "Each dancer feels as if he/she is an important team member"—were examined, and it appeared that, despite efforts to reword appropriately, their content may not have easily transferred to vocational dance contexts. These items were removed from subsequent analyses.

2. Details of the factor analyses performed on each scale are available from the lead author.
3. Evidence of a direct path provides the most convincing evidence of mediation effects occurring (Shrout & Bolger, 2002). In the absence of a direct effect, there may still be evidence of an indirect effect between the two variables (Holmbeck, 1997; Preacher & Hayes, 2008). However, it is not appropriate to consider the mediators as "accounting" for this relationship because their association independent of the mediators was not significant (Hoyle & Smith, 1994).

References

Aalten, A. (2005). 'We dance we don't live'. Biographical research in dance studies. *Discourses in Dance, 3*(1), 5–19.

Adie, J.W., Duda, J.L., & Ntoumanis, N. (2008). Autonomy support, basic need satisfaction and the optimal functioning of adult male and female sport participants: A test of basic needs theory. *Motivation and Emotion, 32*(3), 189–199.

Ames, C. (1992). Achievement goals and the classroom motivational climate. In J. Meece & D. Schunk (Eds.), *Students' perceptions in the classroom: Causes and consequences* (pp. 327–348). Hillsdale, NJ: Erlbaum.

Amorose, A.J. (2007). Coaching effectiveness. In M.S. Hagger & N.L.D. Chatzisarantis (Eds.), *Intrinsic motivation and self-determination in exercise and sport* (pp. 209–227). Leeds: Human Kinetics.

Amorose, A.J., & Anderson-Butcher, D. (2007). Autonomy-supportive coaching and self-determined motivation in high school and college athletes: A test of self-determination theory. *Psychology of Sport and Exercise, 8*(5), 654–670.

Arbuckle, J.L. (1999). *AMOS (Version 17. 0)*. Chicago: Smallwaters Corporation. [Computer software].

Baron, R.M., & Kenny, D.A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*(6), 1173–1182.

Baumeister, R.F., & Leary, M.R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin, 117*(3), 497–529.

Black, A.E., & Deci, E.L. (2000). The effects of instructors' autonomy support and students' autonomous motivation on learning organic chemistry: A self-determination theory perspective. *Science Education, 84*(6), 740–756.

Bowling, A. (1989). Injuries to dancers - Prevalence, treatment, and perceptions of causes. *British Medical Journal, 298*(6675), 731–734.

Bryne, B.M. (2001). *Structural equation modelling with AMOS: Basic concepts, applications and programming*. New Jersey: Lawrence Erlbaum Associates.

Carr, S., & Wyon, M. (2003). The impact of motivational climate on dance students' achievement goals, trait anxiety, and perfectionism. *Journal of Dance Medicine and Science, 7*(4), 105–114.

Caspersen, C.J., Powell, K.E., & Merritt, R.K. (1994). Measurement of health status and well-being. In C. Bouchard, R.J. Shephard, & T. Stephens (Eds.), *Physical activity, fitness, and health: International proceedings and consensus statement*. Champaign, IL: Human Kinetics.

Crocker, P.R.E. (1997). A confirmatory factor analysis of the Positive Affect Negative Affect Schedule (PANAS) with a youth sport sample. *Journal of Sport & Exercise Psychology, 19*(1), 91–97.

Deci, E.L., & Ryan, R.M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum.

Deci, E.L., & Ryan, R.M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11*(4), 227–268.

Duda, J.L. (2001). Achievement goal research in sport: Pushing the boundaries and clarifying some misunderstandings. In G.C. Roberts (Ed.), *Advances in motivation in sport and exercise* (pp. 129–182). Leeds: Human Kinetics.

Duda, J.L., & Balaguer, I. (2007). The coach-created motivational climate. In S. Jowett & D. Lavalee (Eds.), *Social psychology of sport* (pp. 117–130). Champaign, IL: Human Kinetics.

Edmunds, J., Ntoumanis, N., & Duda, J.L. (2006). A test of self-determination theory in the exercise domain. *Journal of Applied Social Psychology, 36*(9), 2240–2265.

Gagne, M., & Blanchard, C. (2007). Self-determination theory and well-being in athletes. In M.S. Hagger & N.L.D. Chatzisarantis (Eds.), *Intrinsic motivation and self-determination in exercise and sport* (pp. 243–254). Champaign, IL: Human Kinetics.

Gagne, M., Ryan, R.M., & Bargmann, K. (2003). Autonomy support and need satisfaction in the motivation and well-being of gymnasts. *Journal of Applied Sport Psychology, 15*(4), 372–390.

Hodge, K., Lonsdale, C., & Ng, J.Y.Y. (2008). Burnout in elite rugby: Relationships with basic psychological needs fulfillment. *Journal of Sports Sciences, 26*(8), 835–844.

Hofmann, R. (1995). Establishing factor validity using variable reduction in confirmatory factor analysis. *Educational and Psychological Measurement, 55,* 572–582.

Holmbeck, G.N. (1997). Toward terminological, conceptual, and statistical clarity in the study of mediators and moderators: Examples from the child-clinical and pediatric psychology literatures. *Journal of Consulting and Clinical Psychology, 65*(4), 599–610.

Hoyle, R.H., & Smith, G.T. (1994). Formulating clinical research hypotheses as structural equation models: A conceptual overview. *Journal of Consulting and Clinical Psychology, 62*(3), 429–440.

Hu, L.T., & Bentler, P. M. (1999). Cut-off criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6*, 1–55.

Kline, R.B. (2005). *Principles and practice of structural equation modeling*. London: The Guildford Press.

Laws, H. (2005). *Fit to dance 2* (2 ed.). London: DanceUK.

Lemyre, P.N., Roberts, G.C., Treasure, D.C., Stray-Gundersen, J., & Matt, K. (2004). Psychological and physiological determinants of overtraining and burnout in elite swimmers. *Journal of Sport & Exercise Psychology, 26* (Suppl.), S118–S119.

Little, T.D., Cunningham, W.A., Shahar, G., & Widaman, K.F. (2002). To parcel or not to parcel: Exploring the question, weighing the merits. *Structural Equation Modeling, 9*(2), 151–173.

Lonsdale, C., Hodge, K., & Rose, E. (2009). Athlete burnout in elite sport: A self-determination perspective. *Journal of Sports Sciences, 27,* 785–795.

MacKinnon, D.P. (2000). Contrasts in multiple mediator models. In J. Rose, L. Chassin, C.C. Presson, & S.J. Sherman (Eds.), *Multivariate applications in substance use research* (pp. 141–160). Mahwah, NJ: Erlbaum.

MacKinnon, D.P., & Fairchild, A.J. (2009). Current directions in mediation analysis. *Current Directions in Psychological Science, 18*(1), 16–20.

MacKinnon, D.P., Lockwood, C.M., Hoffman, J.M., West, S.G., & Sheets, V. (2002). A comparison of methods to test mediation and other intervening variable effects. *Psychological Methods, 7*(1), 83–104.

McAuley, E., Duncan, T., & Tammen, V.V. (1989). Psychometric properties of the Intrinsic Motivation Inventory in a competitive sport setting: A confirmatory factor analysis. *Research Quarterly for Exercise and Sport, 60,* 48–58.

Newton, M., Duda, J.L., & Yin, Z.N. (2000). Examination of the psychometric properties of the Perceived Motivational Climate in Sport Questionnaire-2 in a sample of female athletes. *Journal of Sports Sciences, 18*(4), 275–290.

Nicholls, J.G. (1989). *The competitive ethos and democratic education*. London: Harvard University Press.

Ntoumanis, N. (2001). A self-determination approach to the understanding of motivation in physical education. *The British Journal of Educational Psychology, 71,* 225–242.

Preacher, K.J., & Hayes, A.F. (2008). Contemporary approaches to assessing mediation in communication research. In A.F. Hayes, M.D. Slater, & L.B. Snyder (Eds.), *The Sage sourcebook of advanced data analysis methods for communication research.* Thousand Oaks, CA: Sage Publications.

Quested, E., & Duda, J. L. (2009a, July 2009). Maintaining the balance: Striving for quality and quantity in the growing field of dance psychology. *International Association of Dance Medicine and Science newsletter*.

Quested, E., & Duda, J.L. (2009b). Perceptions of the motivational climate, need satisfaction, and indices of well- and ill-being among hip hop dancers. *Journal of Dance Medicine and Science, 13*(1), 10–19.

Raedeke, T.D. (1997). Is athlete burnout more than just stress? A sport commitment perspective. *Journal of Sport & Exercise Psychology, 19*(4), 396–417.

Raedeke, T.D., & Smith, A.L. (2001). Development and preliminary validation of an athlete burnout measure. *Journal of Sport & Exercise Psychology, 23*(4), 281–306.

Reinboth, M., & Duda, J.L. (2006). Perceived motivational climate, need satisfaction and indices of well-being in team sports: A longitudinal perspective. *Psychology of Sport and Exercise, 7*(3), 269–286.

Reinboth, M., Duda, J.L., & Ntoumanis, N. (2004). Dimensions of coaching behavior, need satisfaction, and the psychological and physical welfare of young athletes. *Motivation and Emotion, 28*(3), 297–313.

Richer, S. F., & Vallerand, R. J. (1998). Construction et validation de l'Échelle du sentiment d'appartenance sociale. *Revue européenne de psychologie appliquée, 48*, 129–137.

Ryan, R.M. (1995). Psychological needs and the facilitation of integrative processes. *Journal of Personality, 63*(3), 397–427.

Ryan, R.M., & Deci, E. (2007). Active human nature: Self-determination theory and the promotion, and maintenance of sport, exercise and health. In M.S. Hagger & N.L.D. Chatzisarantis (Eds.), *Intrinsic motivation and self-determination in sport and exercise* (pp. 1–22). Champaign, IL: Human Kinetics.

Ryan, R.M., & Deci, E.L. (2000a). The darker and brighter sides of human existence: Basic psychological needs as a unifying concept. *Psychological Inquiry, 11*(4), 319–338.

Ryan, R.M., & Deci, E.L. (2000b). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *The American Psychologist, 55*(1), 68–78.

Ryan, R.M., & Deci, E.L. (2006). Self-regulation and the problem of human autonomy: Does psychology need choice, self-determination, and will? *Journal of Personality, 74*(6), 1557–1585.

Segal, L. (2001). The shape of things to come, *The Los Angeles Times,* Available at http://articles.latimes.com/2001/apr/2001/entertainment/ca-45341.

Sheldon, K.M., & Bettencourt, B.A. (2002). Psychological need satisfaction and subjective well-being within social groups. *The British Journal of Social Psychology, 41,* 25–38.

Sheldon, K.M., Elliot, A.J., Kim, Y., & Kasser, T. (2001). What is satisfying about satisfying events? Testing 10 candidate psychological needs. *Journal of Personality and Social Psychology, 80*(2), 325–339.

Shrout, P.E., & Bolger, N. (2002). Mediation in experimental and nonexperimental studies: New procedures and recommendations. *Psychological Methods, 7*(4), 422–445.

Smolak, L., Murnen, S.K., & Ruble, A.E. (2000). Female athletes and eating problems: A meta-analysis. *The International Journal of Eating Disorders, 27*(4), 371–380.

Standage, M., Duda, J.L., & Ntoumanis, N. (2003). A model of contextual motivation in physical education: Using constructs from self-determination and achievement goal theories to predict physical activity intentions. *Journal of Educational Psychology, 95*(1), 97–110.

Standage, M., Duda, J.L., & Ntoumanis, N. (2005). A test of self-determination theory in school physical education. *The British Journal of Educational Psychology, 75,* 411–433.

Standage, M., Duda, J.L., & Pensgaard, A.M. (2005). The effect of competitive outcome and task-involving, ego-involving, and cooperative structures on the psychological well-being of individuals engaged in a co-ordination task: A self-determination approach. *Motivation and Emotion, 29*(1), 41–68.

Steptoe, A., & Butler, N. (1996). Sports participation and emotional wellbeing in adolescents. *Lancet, 347*(9018), 1789–1792.

Thomas, J.J., Keel, P.K., & Heatherton, T.F. (2005). Disordered eating attitudes and behaviors in ballet students: Examination of environmental and individual risk factors. *The International Journal of Eating Disorders, 38*(3), 263–268.

Vilhjalmsson, R., & Thorlindsson, T. (1992). The integrative and physiological effects of sport participation - A study of adolescents. *The Sociological Quarterly, 33*(4), 637–647.

Watson, D., Clark, L.A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54*(6), 1063–1070.

White, R.W. (1959). Motivation reconsidered: The concept of competence. *Psychological Review, 66,* 297–333.

Williams, G.C., Grow, V.M., Freedman, Z.R., Ryan, R.M., & Deci, E.L. (1996). Motivational predictors of weight loss and weight-loss maintenance. *Journal of Personality and Social Psychology, 70*(1), 115–126.

Wilson, P.M., & Rodgers, W.M. (2004). The relationship between perceived autonomy support, exercise regulations and behavioral intentions in women. *Psychology of Sport and Exercise, 5*(3), 229–242.

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