

Multidisciplinary predictors of adherence to contemporary dance training: findings from the UK Centres for Advanced Training

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(Accepted 2 December 2014)

Abstract

Little is known about the predictors of adherence in a dance context. The aim of this study was to investigate adherence to a dance talent programme using a multidisciplinary set of variables representing psychological correlates of adherence, maturation and physical factors relating to dance talent. Psychological (passion, motivational climate perceptions, eating attitudes), physical competence (vertical jump height, handgrip strength, hamstring flexibility, external hip rotation, aerobic fitness), and maturation-related (age of menarche) variables were gathered from female students enrolled on a dance talent programme. Participation behaviour (adherence/dropout) was collected from the talent programme's records approximately two years later. Logistic regression analysis of 287 participants revealed that greater levels of harmonious passion predicted greater likelihood of adherence to the programme, and greater ego-involving motivational climate perceptions predicted less likelihood of adherence. Neither measures of physical competence nor maturation distinguished adhering from dropout participants. Overall, the results of this study indicate that psychological factors are more important than physical competence and maturation in the participation behaviour of young talented dancers.

Keywords: *adherence, dropout, dancing, talent*

Introduction

In order for young people to develop their talents in a given domain, adherence to training is essential. Sport research into adherence and dropout has been conducted since the 1970s (see Burwitz, Moore, & Wilkinson, 1994), but little is known about the predictors of adherence in the related domain of dance. Furthermore, the majority of existing sport and dance research has focused on psychological correlates of adherence, yet in talent contexts physical characteristics can be pivotal to a young person's selection and development. A handful of studies have investigated physical factors in relation to adherence (e.g., Figueiredo, Gonçalves, Coelho E Silva, & Malina, 2009; Hamilton, Hamilton, Warren, Keller, & Molnar, 1997), but to date very few authors have examined both psychological and physical factors concurrently to assess their relative contribution to participation behaviour. Therefore, the aim of this study was to examine the extent to which a multidisciplinary set of variables could predict young dancers' adherence to a talent development programme. These predictor variables

represented both psychological correlates of adherence, and factors associated with dance talent. Establishing the predictors of adherence may aid dance teachers in designing programmes that maximise retention; in particular, the results of this study may help to structure interventions designed to enhance adherence at elite levels.

Psychological Correlates of Adherence

Many psychological correlates of adherence have been well established in sport and dance. According to descriptive studies, common reasons for adhering to sport are enjoyment, social relationships and perceived competence (e.g., Weiss & Petlichkoff, 1989), and similar participation motives have been reported in dance (Alter, 1997; Nieminen, 1998). For example, a recent qualitative study of young talented dancers found that the most important factors associated with commitment were enjoyment, stemming from sources such as self-expression and performing, and social relationships in terms of positive peer interactions and teacher behaviour (Aujla, Nordin-Bates, & Redding, 2013).

Given that enjoyment has consistently been associated with adherence, this study sought to extend previous research by examining whether a deeper form of emotional attachment, and greater activity investment and engagement predict adherence to training.

Passion has been defined as a love for a self-defining activity on which one spends much time and effort (Vallerand et al., 2003). The dualistic model of passion (Vallerand et al., 2003) posits that two types of passion exist. Harmonious passion (HP) is characterised by a flexible activity involvement where the individual participates in the activity of his or her own volition. While the activity is often the most important aspect of a person's life, it does not dominate his or her identity. As a result the individual tends to experience a number of positive outcomes such as positive affect, vitality and flow experiences (see Vallerand, 2012, for a review). Conversely, obsessive passion (OP) is characterised by a rigid persistence in the activity, often deriving from an urge or need to participate, or from certain contingencies that are attached to the activity, such as self-esteem and feelings of social acceptance (Vallerand et al., 2003). Typically, when individuals are high in OP the passionate activity takes on disproportionate importance in their identity, causing conflicts with other life areas. Perhaps unsurprisingly, OP tends to be associated with more negative outcomes such as guilt and rumination (Vallerand, 2012). A recent mixed methods study indicated that a loss of passion was associated with dropout among young dancers (Walker, Nordin-Bates, & Redding, 2012), yet to date only one study has investigated which *type* of passion is most associated with participation behaviour. Bonneville-Roussy, Vallerand, and Bouffard (2013) reported that HP was related to persistence among musicians, which they suggested was in part due to the positive outcomes of HP (such as flow) that encourage commitment. As such, examining this relationship in dance constituted an important aim of the current study.

A second psychological correlate that is relatively well established in sport is the motivational climate. Defined as the teacher-created social environment, the motivational climate tends to be either predominantly task-involving, whereby the focus is on effort and hard work, personal progression and peer collaboration, or ego-involving, whereby the focus is on selective praise and punishment, superior performance and objective talent (Duda, 2001). Sport studies indicate that task-involving climates are associated with adherence (Boiché & Sarrazin, 2009; Le Bars, Gernigon, & Ninot, 2009) while ego-involving climate perceptions are associated with dropout (Pelletier, Fortier, Vallerand, & Brière, 2001; Sarrazin, Vallerand, Guillet, Pelletier,

& Cury, 2002), yet these relationships have yet to be examined in dance. In qualitative studies of commitment and dropout, young dancers identified teacher behaviours characteristic of motivational climates, such as autonomy support and favouritism, which influenced their decisions to stay or leave training (Aujla et al., 2013; Walker et al., 2012). In dance talent contexts, teachers may employ normative comparison and punishment of mistakes in order to promote talent development, but such behaviours could have a detrimental effect on retention rates. Taken together, these relationships are worthy of further investigation in dance.

A final psychological correlate of adherence and dropout that has emerged only in dance literature is disordered eating attitudes. Disordered eating attitudes are abnormal beliefs or behaviours regarding food; as an aesthetic physical activity, it is perhaps unsurprising that disordered eating attitudes are relatively common in dance (see Robson, 2002, for a review). Among other effects, even subclinical forms of disordered eating can result in negative consequences such as fatigue and muscle wastage, which affect a dancer's ability to participate in regular dance activity. Hamilton et al. (1997) found that dropout ballet dancers reported more disordered eating attitudes than their persisting counterparts. The authors suggested that the dropout dancers, who tended to be early maturers, modified their eating behaviour in an attempt to meet the rigid aesthetic criteria of ballet. It was of interest in the current study to investigate whether such findings would be replicated among dancers training in a range of styles that are typically less restrictive in their aesthetic requirements (e.g., contemporary).

Talent Characteristics Related to Adherence

When considering adherence in talent contexts it is important to address not only potential psychological correlates of adherence, but also factors that relate specifically to talent. While most studies of adherence and dropout have adopted a psychological perspective, authors have called for inter- and multidisciplinary investigations (Burwitz et al., 1994; Williams, Hardy, & Mutrie, 2008), which may be particularly pertinent in talent domains where selection is often based upon motor competencies and physical characteristics. Some authors have addressed these calls and as a result, two key themes have emerged from research: actual competence and maturation.

Studies of youth football players have found that persisting athletes display greater actual competence, such as technical and functional skills, than dropout players (Figueiredo et al., 2009; Ommundsen & Vaglum, 1997). Similarly, students who dropped

out of an elite ballet school were more likely to have technical and anatomical limitations that affected their dance technique than persisting dancers (Hamilton et al., 1997). This relationship may exist because actual competence influences competence perceptions (Ommundsen & Vaglum, 1997), which are often cited as a reason for participating in or dropping out of physical activity (e.g., Weiss & Petlichkoff, 1989). Therefore, in talent contexts, where technical ability is often considered pivotally important, factors relating to actual competence may be a relevant consideration in the study of adherence. However, two studies indicated that, once age was controlled for, no differences emerged in a range of anthropometric and performance-related characteristics between adhering gymnasts and those who later dropped out (Claessens & Lefevre, 1998; Lindner, Caine, & Johns, 1991). As such, further research examining the role of actual competence in relation to adherence is warranted.

The current study aimed to extend existing findings by investigating indicators of physical competence in dance, which were previously identified in a comprehensive review of the dance talent literature (Walker, Nordin-Bates, & Redding, 2010). The physical and aesthetic demands of dance vary according to the style; for example contemporary dance typically focuses on dynamic range and movement quality (e.g., suspension, falling), and expressive use of movement, while ballet employs vertical postures and exact placement, focusing on grace and effortless movement. Training differs depending on the technique, but all dance classes will include focus on alignment, placement, control, coordination as well as range of motion, strength and stamina. As such, physical competence was defined for the purposes of this study as components of physical fitness that relate to dance performance, and included vertical jump height, upper body handgrip strength, hamstring flexibility, external hip rotation and aerobic fitness. A more detailed discussion of these variables can be found in Walker et al. (2010, 2011), but as an example, hamstring flexibility and external hip rotation are relevant measures of physical competence due to the aesthetic value placed on large ranges of motion in many dance techniques. Notably, the term *physical* rather than *actual* competence is used; given the complexity and multifaceted nature of dance talent (e.g., as including artistic competencies) it would be difficult to adequately capture actual competence. Moreover, there are no existing validated measures of codified or technical dance skills; components of physical fitness that relate to dance performance were measured as a means of representing the physical competence required to perform dance to a high level.

The second theme relates to biological maturation. Sport studies have shown that early maturers tend to be over-represented in talent development schemes; this is known as the relative age effect (RAE) and occurs because those born earlier in the selection year exhibit more favourable size and strength gains than those born later in the selection year (Musch & Grondin, 2001). The RAE is related to dropout from football (Helsen, Starkes, & van Winckel, 1998) and basketball (Delorme, Boiché, & Raspaud, 2009), perhaps because it can influence both actual and perceived competence. However, the RAE has not been established in dance (van Rossum, 2006), as the opposite effect may be true. Hamilton et al. (1997) found that persisting student ballet dancers tended to be late maturers whereas dropouts were more likely to have matured early or on time. Ballet favours the lean shape associated with late maturation and therefore the persisting dancers appeared to better fit the restrictive criteria of the art form than those who dropped out. The current study will investigate this notion among dancers of different styles where aesthetic requirements are typically less rigid.

In summary, the aim of this study was to investigate adherence to a dance talent programme using a multidisciplinary set of predictors. This is the first study of its kind to examine both psychological factors and dance talent characteristics within the same predictive analysis to assess their relative contribution to adherence. Doing so will help educators to design programmes that encourage retention and adherence among young dancers.

Method

Participants

This study was part of a larger longitudinal research project investigating talent development among young dancers (Aujla, Nordin-Bates, Redding, & Jobbins, 2014; Redding, Nordin-Bates, & Walker, 2011). Participants were female students recruited from eight UK Centres for Advanced Training, nationwide government-funded talent development programmes in dance. The Centres for Advanced Training aim to provide high-quality part-time training to students aged 10–18 years in a range of dance styles. Most Centres for Advanced Training focus on contemporary (modern) dance, although one centre focuses on ballet, one centre has both a contemporary and South Asian dance strand, and one centre has both a contemporary and an urban dance strand. While each Centre for Advanced Training focuses on its particular dance technique (e.g., contemporary), there are typically classes in other styles as well as creative classes, workshops with professional

dancers and companies, and a number of performance opportunities. Dancers typically attend two auditions to secure a place at one of the Centres for Advanced Training; it can be assumed that the study participants possessed talent in dance. At the time of data collection, audition criteria were split into four broad categories: physicality, facility and technical skills; performance qualities and skills; creativity; and approach to working. The first category includes strength, flexibility, mobility, and elevation. As such, the physical competence variables of handgrip strength, hamstring flexibility, external hip rotation and vertical jump height (described below) represented valid means of capturing data highly aligned to the audition criteria.

Given that the current study was part of a larger multisite project, the number of participants contributing data to each variable varied. The total number of adhering dancers in this study was 280, with 127–280 participants providing data depending on the variable. The total number of dropout dancers was 87, with 49–87 participants providing data depending on the variable. Adhering students were aged 14.23 years (± 2.03), had been dancing for 8.86 years (± 3.40), and had been attending their Centre for Advanced Training for 10.39 months (± 13.08). Dropouts were aged 14.66 years old ($\pm .81$), had been dancing for 8.43 years (± 3.48), and had been attending their Centre for Advanced Training for 10.28 months (± 13.02). Table I shows information regarding number of hours in dance training and non-dance physical activity per week, as well as the specific *N* for each variable. There are a number of factors which explain the variance in numbers for each variable. First, the participants ranged in age from 10–18 years, and consequently

a large number did not complete the question pertaining to their age at menarche as they had not yet commenced menstruation. Second, not all students met the criteria of the Passion Scale (see below) meaning that they were excluded from the analyses of HP and OP. Third, a small number of students were injured on the day of testing, meaning they could not participate in some of the physical tests. Finally, a small number of questionnaires were not completed fully.

Measures

Procedure

Once approval was granted by a Higher Education Ethics Committee, informed consent was gathered from all participants. Measures were taken while all of the participants were enrolled at one of the Centres for Advanced Training. With regards to the questionnaire data, all questionnaires were piloted with young people of the same age group prior to any data being collected, resulting in the addition of synonyms or short descriptions to some of the questionnaire items to enhance understanding. During data collection, students completed the questionnaires in groups at their Centre for Advanced Training. At least one researcher was present if the participants had any questions, and they were asked to complete the questionnaires individually. Teachers were requested to not be present to avoid potential socially desirable responding. Data pertaining to whether students dropped out or continued training was collected from the Centres for Advanced Training two years after the measures had been collected.

Table I. Means and standard deviations for all variables, and *t*-value and Cohen's *d* effect sizes from independent *t*-tests for differences between the adhering and dropout students. Numbers of participants providing data for each variable are shown in brackets.

	Adhering students	Dropout students	<i>t</i>	Cohen's <i>d</i>
CAT (h/wk)	7.45 \pm 2.49 (<i>N</i> = 270)	7.79 \pm 3.08 (<i>N</i> = 80)	0.46	0.09
Non-CAT dance (h/wk)	5.05 \pm 4.46 (<i>N</i> = 267)	5.30 \pm 5.95 (<i>N</i> = 79)	0.63	0.07
Physical activity (h/wk)	3.57 \pm 3.12 (<i>N</i> = 266)	3.38 \pm 2.86 (<i>N</i> = 81)	0.30	0.03
Harmonious passion	6.06 \pm .73 (<i>N</i> = 231)	5.72 \pm .98 (<i>N</i> = 61)	2.54	0.57
Obsessive passion	4.39 \pm 1.41 (<i>N</i> = 231)	4.22 \pm 1.43 (<i>N</i> = 60)	0.365	0.07
Task-involving perceptions	4.36 \pm .43 (<i>N</i> = 280)	4.16 \pm .48 (<i>N</i> = 81)	3.77*	0.40
Ego-involving perceptions	1.95 \pm .63 (<i>N</i> = 276)	2.32 \pm .80 (<i>N</i> = 84)	3.82*	0.71
Eating attitudes	4.60 \pm 6.09 (<i>N</i> = 278)	7.00 \pm 8.70 (<i>N</i> = 83)	2.72	0.53
Vertical jump height (cm)	39.25 \pm 5.73 (<i>N</i> = 274)	38.88 \pm 5.55 (<i>N</i> = 86)	0.05	0.004
Handgrip strength (kg)	21.94 \pm 4.89 (<i>N</i> = 273)	21.97 \pm 5.04 (<i>N</i> = 87)	0.95	0.09
Hamstring flexibility (°)	104.85 \pm 10.96 (<i>N</i> = 276)	103.26 \pm 11.42 (<i>N</i> = 87)	1.35	0.12
External hip rotation (°)	53.79 \pm 7.92 (<i>N</i> = 274)	54.03 \pm 8.84 (<i>N</i> = 87)	1.61	0.20
%HRmax Stage 3 DAFT	80.86 \pm 9.32 (<i>N</i> = 275)	80.46 \pm 8.86 (<i>N</i> = 80)	0.49	0.05
%HRmax Stage 5 DAFT	93.24 \pm 6.03 (<i>N</i> = 272)	92.32 \pm 8.01 (<i>N</i> = 79)	0.57	0.05
Age at menarche (years)	12.60 \pm 1.40 (<i>N</i> = 127)	12.68 \pm 1.05 (<i>N</i> = 49)	0.06	0.01

Notes: * denotes *P* < .003; CAT denotes Centre for Advanced Training.

Demographics. Participants reported the number of hours per week they trained at their CAT, at other dance schools, and engaged in non-dance physical activity (e.g., sport, yoga). In order to improve the distribution of these variables for analysis, Log10 transformations were performed using SPSS®.

Passion. The Passion Scale (Vallerand et al., 2003) is a 16-item questionnaire which measures whether an individual is passionate about their “favourite activity”, and the extent to which this passion is harmonious or obsessive. Participants indicated their favourite activity at the top of the questionnaire; those who wrote “dance” and scored four or more on four criteria questions were considered passionate about dance. Those who wrote something other than dance or did not meet the criteria were excluded from analyses. The remaining items pertain to harmonious and OP, scored on two subscales ranging from 1 (*Do not agree at all*) to 7 (*Agree very strongly*). The subscales demonstrated good internal reliability ($\alpha = .79 - .84$) and have been shown to be valid and reliable (Vallerand et al., 2003).

Motivational climate perceptions. Task- and ego-involving motivational climate perceptions were captured using the Perceptions of Motivational Climate in Sport Scale-2 (Newton, Duda, & Yin, 2000), modified for use in dance (Quested & Duda, 2010). The questionnaire comprises 24 items in 5 subscales: Cooperative Learning, Effort and Improvement, and Important Role (combined to measure task-involving climate features), and Punishment for Mistakes and Unequal Recognition (combined to measure ego-involving climate features). Items are scored on a scale from 1 (*Strongly disagree*) to 5 (*Strongly agree*). One item (“Dancers are afraid to make mistakes”) was deleted from the Punishment for Mistakes subscale in order to improve reliability; after this Cronbach’s alphas were acceptable for all subscales ($\alpha = .74 - .91$). Acceptable reliability and validity has been demonstrated for both the sport (Newton et al., 2000) and dance (Quested & Duda, 2010) versions of the questionnaire.

Eating attitudes. Disordered eating attitudes relating to anorexia nervosa and bulimia nervosa were assessed using the Eating Attitudes Test (EAT-26; Garner, Olmsted, Bohr, & Garfinkel, 1982). It consists of 26 items in three subscales (Dieting, Bulimia and Food Preoccupation, and Oral Control) scored on a scale ranging from *Always* to *Never*. While the internal consistency for the Dieting subscale was good ($\alpha = .82$), items 9 and 26 from the Bulimia and Food Preoccupation subscale, and items 2 and 19 from the Oral Control subscale, had to be

removed before acceptable internal reliability was reached ($\alpha = .65 - .71$). Scores can be summed for each subscale but a total score can also be calculated. For the purpose of this study, analyses were conducted with the overall total score, in line with a previous study of this cohort (Nordin-Bates, Walker, & Redding, 2011). Acceptable reliability and validity information is published in Garner et al. (1982). EAT-26 scores were log-10 transformed in SPSS® to improve distribution prior to analysis.

Vertical jump height. Vertical jump height was assessed using a jump belt (Probotics Inc., Huntsville, AL). Participants stood on a mat and were instructed to jump vertically as high as they could. This method represents a reliable means of measuring lower limb muscular power, and has been used in previous studies of dancers (e.g., Wyon et al., 2007). Measures were taken in centimetres and the higher of two jumps, separated by a 30 second rest period, was used for analyses.

Upper body strength. Upper body strength was measured using a handgrip dynamometer (Takei Scientific Instruments, Tokyo, Japan). Handgrip strength was assessed as an indicator of global upper body strength given that previous research has demonstrated a relationship between handgrip strength and other measures of upper body muscular strength (e.g., Milliken, Faigenbaum, Loud, & Westcott, 2008). Participants were instructed to hold the dynamometer above their heads with the elbow extended and grip the bar maximally. The test was made more dance-specific by asking participants to bring the dynamometer down to the lateral side of their bodies through the sagittal plane while continuing to grip the bar and keep the elbow extended. The average of two trials for each arm, separated by a 30 second rest period, was computed, before an overall average upper body strength variable was calculated.

Hamstring flexibility. Active and passive hamstring flexibility was measured using straight leg raise assessments. For the active test, participants lay prone on a mat and were instructed to raise one leg at a time towards their chest as far as possible while keeping the knee extended. For the passive test, the researcher moved the leg to the point of resistance. The researcher monitored the dancer’s pelvic position via movement of the anterior superior iliac spine. This functional test represents the participants’ range of motion in a typical dance position, and has been used in previous investigations of dancers’ flexibility (e.g., Crookshanks, 2007). Measurements were taken using a custom-made

protractor and an average of two trials for each leg was calculated. Due to high correlations between the active and passive measures ($r = .80$, $P < .01$), an overall average flexibility score was computed to avoid multicollinearity at the data analysis stage.

External hip rotation. External hip rotation was assessed using Functional Footprints® (Balanced Body, Sacramento, CA), rotator discs which allow maximum rotation in the hip and lower leg with minimal friction. Participants stood on the rotator discs and were instructed to externally rotate their hips maximally while keeping the knees extended. Scores were displayed in degrees on the base of the discs. An average of three trials was computed for each leg, and then an overall external hip rotation variable was calculated. This method of measuring external hip rotation is recommended for dance research by dance medicine specialists (Grossman, 2003).

Aerobic fitness. Aerobic fitness was measured using the Dance Aerobic Fitness Test. The Dance Aerobic Fitness Test is a validated sub-maximal test (Wyon et al., 2003), comprising five 4-min stages of contemporary dance movement, which increase in intensity at each stage. Stage 3 is designed to replicate the demands of dance class; Stage 5 the demands of performance. Participants wore heart rate monitors (Polar Team) and recorded their heart rates at the end of each stage. For analysis, the percentage of participants' age-predicted maximum heart rate was used as an indicator of intensity ($220 - \text{age}$).

Age at menarche. Participants were asked at which age, if at all, menarche had commenced. This was used as an indication of biological maturity.

Analysis

Independent t -tests comparing adhering and dropout dancers on all measures were used to identify potential predictor variables. This was an important initial step because entering all of the potential predictor variables into the main analysis at once would have violated sample size calculations (Peduzzi, Concato, Kemper, Holford, & Feinstein, 1996). Logistic regression was employed to assess whether these variables could predict adherence to the Centres for Advanced Training. Given the range of participants' ages (10–18 years), age was entered on the first step as a covariate, and the potential predictor variables were entered on the second step.

Results

Means and standard deviations of each variable for adhering and dropout participants are presented in Table I, together with t values and Cohen's d effect sizes for differences between the two groups.

Preliminary t -tests

Inspection of the descriptive data revealed few differences between the adhering and dropout participants. In order to statistically explore differences between the two groups, independent t -tests were conducted. Cohen's d effect size was also calculated for each t -test to minimise sample size bias in interpreting the P -values (see Table I). Differences between the two groups sufficient to justify inclusion in the main analysis were judged in terms of both P - and d -values whereby effect sizes of 0.5 or above indicated a moderate to large practical difference between the groups (Cohen, 1988). After applying a Bonferroni correction of .003 (.05/18 variables), significant differences between adhering and dropout students emerged in task-involving, $t(359) = -3.77$, $P < .001$, and ego-involving motivational climate perceptions, $t(358) = 3.82$, $P < .001$. According to effect sizes there was a difference of practical significance between adhering and dropout students in HP and EAT-26 scores ($d = 0.57$ and 0.53 , respectively).

When compared to dropout students, adhering dancers reported greater HP and task-involving motivational climates perceptions, and lower ego-involving climate perceptions and EAT-26 scores. No significant differences or moderate-large effect sizes were observed when comparing the groups on the physical competence or maturation variables. Therefore, task-involving and ego-involving motivational climate perceptions, HP and EAT-26 scores were entered as predictor variables in the logistic regression analysis.

Logistic regression

Three versions of the logistic regression were run because regression models should be simplified where possible by reducing the number of predictors provided a good model fit remains (Tabachnick & Fidell, 2007). The full model containing all four predictors (HP, task-involving and ego-involving motivational climate perceptions, and EAT-26 scores) was significant, $\chi^2(5, N = 282) = 13.67$, $P < .05$, exhibited a good model fit according to the Hosmer and Lemeshow test ($P > .05$), and correctly classified 80.1% of cases. Only HP made a marginal contribution to the model ($P = .06$). The number of variables in the model was then reduced

consecutively according to their effect size (as indicated by odds ratios; Tabachnick & Fidell, 2007). Consequently, EAT-26 scores were removed from the second model because these demonstrated the smallest effect size compared to the other variables ($\text{Exp}(\beta) = 1.45, 0.67, 1.18$, and 0.997 for HP, ego-involving perceptions, task-involving perceptions, and EAT-26 scores, respectively). The second model included HP, task-involving and ego-involving climate perceptions. This model was significant, $\chi^2(4, N = 283) = 13.53, P < .05$, correctly classified 80.2% of cases, and exhibited a good model fit. Only HP made a unique significant contribution to the model ($P = .05$).

The final version was run with HP and ego-involving perceptions only, because task-involving motivational climate perceptions demonstrated a smaller effect size than these two variables ($\text{Exp}(\beta) = 1.47, 0.69, 1.20$ for HP, ego-involving perceptions, and task-involving perceptions, respectively). The full model was significant, $\chi^2(3, N = 287) = 13.97, P < .01$, correctly classified 79.4% of cases, and demonstrated a good model fit, Hosmer and Lemeshow: $\chi^2(8, N = 287) = 8.24, P = .41$. Ego-involving climate perceptions significantly and negatively predicted adherence ($P < .05$), whereas HP significantly and positively predicted adherence ($P = .05$); HP was the most influential predictor according to odds ratios (see Table II). This model was deemed preferable due to the reduced number of variables while maintaining good model fit. In this model, Cox and Snell R square = 4.7%, and Nagelkerke R squared = 7.4%. Overall, students with greater levels of HP were more likely to adhere to the CATs than students with lower levels of HP, while those with greater ego-involving motivational climate perceptions were less likely to adhere compared with students reporting lower ego-involving climate perceptions.

Discussion

The aim of this study was to investigate adherence to dance using a multidisciplinary set of variables representing both psychological factors and factors associated with dance talent. There is a paucity of multidisciplinary research in this area, despite calls

for more studies of this nature (Burwitz et al., 1994; Williams et al., 2008). In answering these calls, this study revealed new findings regarding the relative importance of different variables to young contemporary dancers' participation behaviour. Specifically, only two variables, HP and ego-involving climate perceptions, emerged as predictors according to the logistic regression analysis. Therefore, at least among young dancers, psychological factors have the greatest impact in relation to adherence.

Students reporting greater levels of HP for dance were more likely to adhere to training than students reporting lower HP. This is only the second study to have investigated such a relationship and supports the findings of Bonneville-Roussy et al. (2013). Dance and sport research has typically focused on enjoyment (e.g., Alter, 1997; Weiss & Petlichkoff, 1989) but has not explored whether a deeper emotional attachment can predict adherence. Given the role of passion in dance commitment and dropout highlighted in recent qualitative research (Aujla et al., 2013; Walker et al., 2012), such a finding is a valuable step forward in establishing not only the role of passion itself but also of the types of passion in adherence to dance.

The fact that only HP, and not OP, predicted adherence is especially interesting considering the traditional stereotype that dancers must sacrifice everything for their art, which is in line with the rigid persistence characteristic of OP that can lead to conflicts between the passionate activity and other life areas (Vallerand et al., 2003). However, the current study suggests that young people adhere to a self-defining activity because of their passion for it, but while it becomes part of who they are, the activity does not take up a disproportionate part of their identity. Dance can be a young person's main passion, but it can be typified by a healthy involvement that does not completely overshadow other aspects of life. The finding is also encouraging as HP is associated with such outcomes as positive affect and vitality (Vallerand, 2012). Taken together, HP may not only enable young dancers to stay engaged in an activity they love, but doing so may also contribute to their well-being.

The second independent predictor of adherence was ego-involving motivational climate perceptions.

Table II. Logistic regression results for the third model.

	β	F	Sig	$\text{Exp}(\beta)$	Lower confidence interval	Upper confidence interval
Age	-.05	.41	.52	.95	.82	1.11
Ego-involving perceptions	-.49	4.86	.03	.61	.40	.95
Harmonious passion	.36	3.73	.05	1.44	1.00	.207
Constant	.92	.28	.60	2.50		

Students reporting greater ego-involving motivational climate perceptions were less likely to adhere to their Centre for Advanced Training than students reporting lower ego-involving perceptions, supporting previous studies that reported associations between ego-involving climate elements and dropout in sport (Pelletier et al., 2001; Sarrazin et al., 2002) and dance (Walker et al., 2012). Perceptions of ego-involving climates in dance are related to physical and emotional exhaustion (Quested & Duda, 2010) and anxiety (Nordin-Bates, Quested, Walker, & Redding, 2012). As such, if young dancers feel that their well-being is compromised by their social environment, they may choose to remove themselves from that environment. Although not contributing to the predictive analysis, adhering students also perceived their learning climate to be more task-involving than dropout students, which supports previous reports that adherence is associated with task-involving motivational climate perceptions (Boiché & Sarrazin, 2009; Le Bars et al., 2009).

An interesting question to consider is why the dropout participants perceived the motivational climate differently to adhering students. Were the students treated differently by their teachers or did they perceive their teachers' behaviour differently? When coaches have high expectancies of their athletes, they tend to spend more time with them, offer them greater challenges and provide more feedback (Solomon, DiMarco, Ohison, & Reece, 1998; Solomon et al., 1996). Potentially, a similar phenomenon occurs when teachers perceive their students to be particularly committed. Alternatively, students may interpret feedback in different ways. For example, dancers with high levels of perceived competence could interpret interpersonal comparison as being informative or motivating, whereas those low in perceived competence may perceive the same cues as teacher favouritism (Duda, 2001). It is also possible that greater HP helps dancers to override any negative environmental cues (although it is important to note that participants on the whole perceived their climate as being more task- than ego-involving). While the answer to this question likely lies in a combination of these suggestions, it appears clear that teachers should create task-involving motivational climates in talent settings, in order to increase both adherence and elements of well-being (e.g., Duda, 2001; Le Bars et al., 2009).

It is furthermore important to note that, while not a predictor of adherence, differences in EAT-26 scores emerged between the adhering and dropout groups. Although the large standard deviation in scores suggests that these results should be interpreted cautiously, the finding does provide some support for Hamilton et al.'s (1997) study in which dropout ballet students reported greater disordered

eating characteristics than their persisting counterparts. Even though the participants in the current study were mainly engaged in contemporary dance, some young dancers may still perceive particular aesthetic requirements and consequently restrict their nutritional intake; this may make it difficult for them to engage in dance activity due to fatigue, malaise and self-consciousness (Robson, 2002). Previous research with the Centres for Advanced Training cohort indicated that correlates of disordered eating attitudes among female dancers included self-evaluative perfectionism, sleep disturbance, menstrual dysfunction and excessive exercising (Nordin-Bates et al., 2011). Therefore, teachers should encourage students to set challenging but realistic goals, give constructive rather than negative feedback, and where possible monitor factors outside of dance such as physical activity levels. Positively, Nordin-Bates et al.'s (2011) findings were used to create an evidence-based eating disorders policy for the Centres for Advanced Training in order to assist educators in preventing and identifying disordered eating characteristics, as well as to support young dancers who are symptomatic of disordered eating. Such a practical outcome is recommended for all dance schools and institutions.

No significant differences emerged between adhering and dropout students in the physical variables, contrasting some findings in sport and dance regarding the roles of physical competence (Figueiredo et al., 2009; Hamilton et al., 1997; Ommundsen & Vaglum, 1997), and maturation (Delorme et al., 2009; Hamilton et al., 1997; Helsen et al., 1998). It appears that neither physical competence nor maturation are important in terms of adherence and dropout among this talented young cohort; instead psychological factors are most important. Claessens and Lefevre (1998) similarly suggested that only psychological and social factors influence participation behaviour, as in their study, no significant differences between adhering and dropout gymnasts were apparent in maturation- and performance-related characteristics. Collectively these conclusions appear valid, and consequently interventions designed to maximise retention rates should focus on the psychological correlates of adherence and dropout.

Two key practical implications have arisen from this study that will enable educators to maximise adherence to their programmes. The first is that in order to enhance HP, educators should encourage students to cultivate interests and social groups outside of dance, and instil in them a sense of autonomy. This can also be achieved via the second implication: the creation of task-involving motivational climates. Not only may this increase adherence in and of itself, but it may also facilitate the strongest predictor of adherence in the current

study, HP. Recent research with the same cohort revealed that increases in task-involving climate perceptions over time predicted increases in HP (Redding et al., 2011), which indicates that the two predictors of adherence are related. Therefore, teachers should emphasise personal progression, effort and peer collaboration, and treat all students equally to create a learning environment that can enhance both well-being and adherence.

Limitations

The effect sizes for the regression analysis were relatively small, indicating that HP and ego-involving climate perceptions only represent part of the explanation as to why students persist with training. This is supported by the broad range of reasons given by committed and dropout Centres for Advanced Training students in qualitative studies (Aujla et al., 2013; Walker et al., 2012), highlighting the complexity of commitment, adherence and dropout among young dancers. Furthermore, ideally, the same number of participants would have contributed data to each variable, yet given the nature of large-scale field research this was unavoidable. However, the choice of a robust analysis method helped to minimise this limitation.

It is possible that the physical competence variables investigated did not fully capture competence in dance, as they were focused more on components of physical fitness than technical or artistic abilities. Although factors such as strength and flexibility are important to dance performance, dance talent is complex and multifaceted, comprising of artistic and technical skills beyond pure physical capacity or fitness (Walker et al., 2010). Further research could endeavour to create valid measures of technical and artistic dance skills in order to extend this research and more accurately investigate physical or actual competence. Moreover, while there are potential problems when using self-report measures among young people, the internal reliabilities of the measures and the stability of the results over time (see Aujla et al., 2014; Redding et al., 2011) suggests that the data were robust. Finally, the Centres for Advanced Training are a relatively new scheme, with an interest in dance science research and application. Therefore, the results of the current study may not generalise to other dance environments.

Conclusion

In conclusion, psychological factors are more important than physical ones in relation to adherence and dropout among young talented dancers. Adhering students and those who later dropped out were distinguished by their levels of HP and motivational

climate perceptions rather than their physical competence. Overall, while adherence and dropout is complex, the current study has provided an important step towards understanding the factors that impact upon young dancers' participation behaviour.

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