

A longitudinal study of psychological needs satisfaction, value, achievement, and elective music intentions

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journals.sagepub.com/home/pom**Andrew Kingsford-Smith and Paul Evans** 

Abstract

This study aimed to explain motivational factors that influence students' intentions to continue studying music in high school and their achievement in high school music. The participants were 180 male Year 7 and 8 students in a high school in Australia. Principles of self-determination theory were used to hypothesize a structural equation model (SEM), in which the satisfaction of basic psychological needs predicted students' valuing of music as a school subject, as well as their intentions to continue and their achievement. A two-wave longitudinal design was used to account for prior variance in the dependent variables and to expand on prior, cross-sectional research. The SEM explained 73.1% of the variance in music elective intentions, 60.7% of the variance in students' valuing of music, and 53.7% of estimated grade. The findings build on existing research regarding the importance of psychological needs satisfaction in the domain of music and the longitudinal findings lend further support for causal links between the fulfillment of basic psychological needs and the internalization of values in the domain of music education. The results and implications for future research and practicing teachers are discussed.

Keywords

music education, self-determination theory, motivation, value, achievement

Around the world, students are given increasing choice about which subjects they pursue as they progress through schooling. In Australia, in the state of New South Wales (NSW), for example, students are usually given the opportunity to choose two elective subjects in Years 9 and 10, alongside their studies of “core” subjects (Board of Studies, Teaching and Educational Standards NSW, 2002). This elective choice is also influential on the subjects student may take in their final years of high school, which can affect overall school achievement, university

School of Education, University of New South Wales, Sydney, NSW, Australia

Corresponding author:

Paul Evans, School of Education, University of New South Wales, Sydney, NSW 2052, Australia.

Email: paul.evans@unsw.edu.au

admissions, and career certainty (Galliot & Graham, 2015; Wang, 2013). In addition, this choice has impacts on the key learning areas (KLAs) in the school, as departments often receive school funding based on student enrolment numbers.

Music is an interesting case study regarding elective intentions and academic outcomes in high schools. In NSW, music is a mandatory subject from kindergarten to Year 8, but it becomes an elective from Year 9 onward. Australian research has identified that many students hold low value toward music studies, which is linked to students discontinuing music and having lower engagement (Lowe, 2011; McEwan, 2013; McPherson, Osborne, Barrett, Davidson, & Faulkner, 2015; Waters, McPherson, & Schubert, 2014). This issue is not limited to the Australian context, with low valuing of music education noted as an international phenomenon (Ghazali, 2006; Koh, 2011; McPherson & O'Neill, 2010; Simpkins, Vest, & Becnel, 2010). A largely unanswered question, particularly in music education literature, is where these values are derived from or the processes by which students come to develop a particular set of values for music.

Another crucial aspect of students' elective intentions is the way they are formed and dynamically unfold over time. Longitudinal research is therefore crucial in understanding these processes. Whereas cross-sectional results can provide support for these processes, longitudinal research is able to much more clearly provide evidence not only for correlational relationships at a given point in time, but also for studying changes over time (Little, 2013), such as how changes in psychological needs satisfaction influence students' elective subject choices.

The present study addresses these issues. The following section outlines previous research on students' motivations for music learning, including their motivations for choosing to study music as a school subject, with an emphasis on the advantages of a longitudinal perspective. First, general research on subject choice is reviewed. Second, the role of value in music learning is discussed. Finally, more recent research adopting self-determination theory (SDT) is presented, providing the backdrop for the present study's specific aims and hypotheses.

How students choose subjects at school

Previous research has investigated different factors that influence students' elective subject and school activity choices. Some of these factors include subjective task value (Bong, 2001; Freer & Evans, 2018; Koh, 2011; Meece, Wigfield, & Eccles, 1990; Waters et al., 2014), competence beliefs (Daly & Last, 2017; Waters et al., 2014), perceptions of teachers (Ardzejewska, Piscioneri, & Goode, 2014; McEwan, 2013; Waters et al., 2014), peer influence (Adderley, Kennedy, & Berz, 2003; Patrick et al., 1999; Waters et al., 2014), and family influence (Adderley et al., 2003; Kelly, 2015). This list of factors can all be seen to be linked to a sense of *value* of music for the student, whether it be valued from within the student, such as competency beliefs, or from external factors, such as peer and family values.

Value is a concept that has been used to examine student subject choices, informed generally by the dominance of Wigfield and Eccles' (2000) expectancy-value theory. The theory argues that students' achievement-related choices are jointly predicted by the value held toward the task (subjective task value) and the beliefs about how well they would perform in the task (expectancy beliefs). The theory elaborates on the construct of subjective task value and articulates the dimensions of importance (attainment value), enjoyment (interest value), usefulness (utility value), and difficulty of a task (perceived cost; Wigfield & Eccles, 2000).

Wigfield and Eccles' (2000) expectancy-value theory also takes into account the influence of contextual aspects on students' expectations for success and subjective task value. These include factors such as age and gender. Wigfield's (1994) research highlights that younger

students in primary school pursue activities that they are interested in, regardless of their competence beliefs. This suggests that intrinsic value is of greater importance than expected success in certain age ranges. The correlation between value and competence beliefs then grows as students get older, indicating the increasing influence of expected success. However, students' competence beliefs and perceived usefulness and importance of school activities decrease as students became older (Wigfield et al., 1997). Gender too can affect value in school activities; Eccles and Harold (1992) posit that the different values that men and women develop through socialization affect students' educational choices. Watt's (2004) investigation into the trajectories of students' value toward school subjects showed that intrinsic value toward mathematics declined at similar rates for both male and female students; however, males overall valued maths more than females, while females held greater value toward English. Value toward school subjects can therefore be seen to be influenced by student demographic factors.

Previous studies have demonstrated the utility of expectancy-value theory in investigations of students' elective subject choices. Meece et al. (1990) found that the subjective task values of Year 7 to 9 students were the best predictors of the decision to continue studying mathematics. Eccles, Barber, and Jozefowicz (1998) identified that expectancies for success and value in maths and science subjects predicted the intention to pursue maths and science-related occupations. They posit that expectations for success depend on the confidence that the individual holds and on the estimated difficulty of the course. This aligns with Daly and Last's (2017) study into the elective choices of university students. Their research identified expected grade as the strongest predictor for subject choice, with students looking for the easiest subject to get an "A" grade in. Expectancy-value theory also postulates a relationship with academic achievement. Meece et al.'s (1990) study found that expectations of success and subjective task value predicted two different outcomes; expectations predicted academic grades, while value predicted enrolment intention. Further exploring this relationship, Trautwein et al. (2012) found an interaction effect in expectancy and value on achievement, where multiplication of the two scores significantly predicted students' grades. This result indicates that while expectations of success is a better predictor of academic achievement, value is still a necessary component, as only students with both high value and expectations achieved the highest academic achievement scores.

Thus, value seems to be implicated as a major predictive factor for intending to study a subject as an elective choice. On one hand, this might seem obvious—indeed it would be surprising if students were choosing to study a particular school subject if they did not value it. On the other hand, a fuller explanation of the relationship between value and subject choice can expand on previous research. The present research thus addresses this both by examining potential antecedents of students' values, as well as incorporating a longitudinal perspective to study how changes in values and their antecedents predict students' elective subject choices. Before elaborating on the conceptual framework used to do this, we now take a closer look at research on value in music education.

Value in music education

Across the previous research, music and sport have received particular attention both as school subjects and extracurricular activities, with several studies comparing students' perceptions on the two areas (Martin, 2008; McEwan, 2013; McPherson & O'Neill, 2010; Patrick et al., 1999; Waters et al., 2014). McEwan (2013) found that far more students perceived their school as valuing sport over music. Similarly, McPherson and O'Neill (2010) identified that in seven out

of eight countries surveyed, students held higher value and competency beliefs toward physical education than music. Music therefore appears to be consistently valued very poorly as a school subject in comparison to sport. However, despite these differences, Martin (2008) indicates that there is relative invariance between the impact of motivation and engagement constructs in music and sport—that is, although students might value music less than sport, the mechanisms by which motivation and engagement impact other outcomes appear to be similar.

More recently, Freer and Evans (2018) identified that students' value toward music as a school subject was a better predictor of elective choice than the number of years students played a musical instrument. Similarly, Waters et al.'s (2014) study of high school elective subjects found that components of expectancy-value theory were significant facilitators for electing music, including interest, subject importance, and competency beliefs. The values held toward other activities can also impact students' ongoing participation in music; Hawkinson (2015) found that the value held toward activities that conflicted with the schedule of music programs were strong predictors of continued participation. This is especially relevant to electing music as a school subject, as students often only have a limited number of elective choices, meaning that they must decide which elective subject they value most.

Students' value toward music can be influenced by demographic factors such as age, gender, and socioeconomic status (SES). Koh's (2011) research found that older adolescent students value music less than younger students, while McPherson et al. (2015) identify that female students generally hold greater value toward music more than their male counterparts in primary school and early years in high school. McPherson et al. (2015) also found that high SES students in the early years of high school often value music significantly less than students in lower and middle SES levels. They suggest that more affluent students may be making earlier career choices, which would be negatively influenced by the lower utility value held toward music. These findings indicate a complicated web of relationships that teachers must navigate when trying to nurture students' value toward their subjects.

Recent research on SDT

As noted above, the present study expands on previous research on value by examining potential antecedents of value. SDT (Ryan & Deci, 2017) is a theory of motivation particularly concerned with how people internalize the values of their social environments. It may therefore be a useful conceptual framework to understand how value toward an activity can be developed. The theory posits that social-contextual conditions can either nurture or hinder intrinsic motivation, self-regulation, and psychological well-being. SDT classifies motivation across a continuum, with amotivation on one end and intrinsic motivation at the other. Between these two extremes are different forms of extrinsic motivators including relatively external regulation (e.g., punishments, rewards, ego involvement) and relatively internalized regulation (e.g., valuing a task, alignment of the task with one's sense of self). Ryan and Deci (2017) use the term "internalisation" to describe the process in which students develop value toward a task through the satisfaction of psychological needs.

Integral to the theory are three psychological needs: *autonomy*—a student's volition and willingness to engage with an activity free of external pressures; *competence*—a student's sense of effectiveness in an activity; and *relatedness*—a student's feeling of belongingness and connectedness in a particular social environment (Deci & Ryan, 2000; Ryan & Deci, 2017). The satisfaction of these three needs is theorized to help people internalize the values of social environments (e.g., to more deeply understand the value of studying music for one's life). In addition, needs satisfaction can lead to significant educational benefits, such as improved rates of

engagement, intrinsic motivation, creativity, grades, psychological well-being, and school satisfaction (e.g., Reeve, 2009). Needs satisfaction and autonomous motivation can have similar positive effects on engagement and well-being across both gender and culture, despite differences in the level of needs satisfaction experienced and differences in engagement coping strategies (Bonneville-Roussy, Evans, Verner-Filion, Vallerand, & Bouffard, 2017; Chen et al., 2015). Teachers can therefore foster student value toward a task through satisfaction of autonomy, relatedness, and competence (Reeve, 2009).

Previous research has identified the importance of psychological needs satisfaction in students' motivation for continued participation in music learning. The previously mentioned Freer and Evans (2018) study provided evidence that needs satisfaction both predicts elective intention directly, as well as indirectly via value, providing supportive evidence for the hypothesis that needs satisfaction in music may have helped students to internalize the value of studying music. Evans, McPherson, and Davidson (2012) found that at the same time students reported giving up on learning their instruments, they reported lower satisfaction of their psychological needs of autonomy, competence, and relatedness. Evans and Liu (2019) took a similar approach and found that needs satisfaction (positively) and needs frustration (negatively) predicted students' intentions to continue in a high school orchestra program. Beyond the high school classroom, SDT research has also studied university music contexts; Evans and Bonneville-Roussy (2016) found that when musicians' psychological needs were satisfied, they had higher internalized motivation, and practiced more frequently, more productively, and with a preference for greater challenges in their practice. Bonneville-Roussy et al. (2017) also found autonomous motivation to be an important factor in university music students responding to the stress of academic assessment as measured by their performance in examinations and their intentions to continue with music as a career. Although these latter examples are outside the context of the present research problem, it is clear that many of the outcomes they measure are of similar importance to high school music education (i.e., intentions to continue music, more engagement in learning, more productive engagement in learning, and reduced stress). The motivating attributes of needs satisfaction can be seen to therefore influence students' choices to continue or cease music activities.

Importantly, psychological needs satisfaction influences not just motivation and behavior but also achievement. In a meta-analysis on factors that affect school achievement, Hattie (2008) found that motivation has a large effect size ($d = 0.48$) in school learning contexts. Other recent studies have found the same (Badri, Amani-Saribaglou, Ahrari, Jahadi, & Mahmoudi, 2014; Jang, Kim, & Reeve, 2012; Reeve, 2012). Further investigating this hypothesis, Taylor et al.'s (2014) longitudinal study found that intrinsic motivation was the only motivation type on the SDT spectrum to consistently predict academic success in a sample of high school students. Notably, the longitudinal aspect of the Taylor et al. (2014) study was able to model changes in motivation over time, to which the students' academic achievement could be attributed.

Summary and aims of the current study

The above review of literature has noted that in outcomes important for music education (particularly intentions to continue and achievement in the subject), value has been shown as a vitally important predictor. Furthermore, the conceptual framework of SDT, as well as several research studies in music education, have shown the potential for psychological needs in predicting students internalizing their value for learning music and their motivation to continue. As noted throughout the review, however, there remains the need for longitudinal research to

examine specifically how changes in psychological needs satisfaction and changes in value over time influence the outcomes of interest.

The current study aims to examine the role and relationships of psychological needs satisfaction and value on two important outcomes—expected grade and intention to continue studying music. First, following the findings of Freer and Evans' (2018) research, we aimed to test the hypothesis that value partially mediated the relationship between psychological needs satisfaction and intentions to choose music as a school subject (Hypothesis 1). Second, we aimed to examine the role of students' expected grades as an outcome of their music learning alongside their intentions to continue (Hypothesis 2). Third, we examined the extent to which this finding held up over time—that is, the extent to which changes in students' elective intentions across part of a school year can be attributed to changes in their psychological needs satisfaction and value during that time by accounting for prior variance in the dependent variables (Hypothesis 3).

Method

Participants and procedure

This study took place in NSW, a state in Australia where, like many other states and education systems in the world, music is a mandatory subject at the start of high school and eventually becomes an elective choice among other subjects. The study surveyed 180 students (out of a total of 434) in Year 7 (65 students—36%) and Year 8 (115 students—64%). All students were invited to complete the survey during class time, and only students who consented were included in the study. The mean age was 13.73. The school had a high socioeconomic advantage score on the Index of Community Socio-Educational Advantage (more than one standard deviation above the mean on ICSEA; see myschool.edu.au). The survey was conducted as a two-wave longitudinal study, with 6 months between the surveys. The procedures used in the study were approved by the university human ethics advisory panel and by the administration of the school involved.

Measures

Psychological needs satisfaction. This study adapted the Balanced Measure of Psychological Needs (Sheldon & Hilpert, 2012) to measure students' psychological needs satisfaction in music classes. Students were asked to complete three items for each of the psychological needs using 7-point Likert-type scales (*strongly disagree* to *strongly agree*). Example items include “When I am in this subject I am able to make choices and do things my way” (autonomy), “When I am in this subject I successfully learn difficult things” (competence), and “When I am in this subject, I feel a strong sense of belonging” (relatedness).

The items of each psychological need scale were transformed into item parcels using the mean of the scores. Item parceling is often used when measuring first-order factors that form into higher order latent factors (Kishton & Widaman, 1994). The item parcels in this study were made under the following guidelines by Kishton and Widaman (1994): the items were part of a known scale; no item was assigned to more than one parcel and the reliabilities of the items in the parcels were $\alpha > .60$.

Value. Value was measured through a single item from the Motivation and Engagement Scale (Martin, 2007). The Motivation and Engagement Scale has been used to measure students' value toward sports and music in previous studies (Martin, 2008). The single

7-point Likert-type scale item used was “When I am in this subject, what I learn in this subject is important and useful.” The use of single items to measure self-reported, schematized constructs has been accepted and validated by other researchers (Bergkvist & Rossiter, 2007; Dollinger & Malmquist, 2009; Robins, Hendin, & Trzesniewski, 2001). More specifically, this particular single item has been used in several studies to indicate value in the short form of the Motivation and Engagement Scale and has been found to provide model structure and fit indices consistent with multi-item measures of value (Martin, 2006; Martin, Mansour, & Malmberg, 2019; Martin et al., 2015).

Expected grade. Students were asked to indicate the grade they expected they were currently on in their music class. In alignment with previous studies (Cheon, Reeve, & Moon, 2012; Jang et al., 2012), participants were asked to indicate their expected grade as a percentage mark, displayed in 5% increments from 10% to 100%. Previous studies have shown that self-judgment measures are strong indicators of actual achievement (Jang et al., 2012; McCormick & McPherson, 2007). This item was therefore used as a proxy for students’ achievement in the subject.

Elective intention. Elective intention was measured through three 7-point Likert-type scale items. These items were adapted from research by Freer and Evans (2018) and Cheon et al. (2012). A sample item from the scale is “I would like to continue studying this subject at school.”

Analytical approach

This study used a structural equation model (SEM) approach to examine the relationships in a hypothesized model. SEM allows researchers to measure the effect size of hypothesized paths between multiple latent variables and to model evidence of theoretically causal relationships or covariance between multiple constructs. Researchers use model fit indices to scrutinize the degree to which models predict the data on which they are based. SEM also incorporates confirmatory factor analysis (CFA), which provides advantages such as purging the latent constructs of measurement error.

Mplus version 7.4 was used for the analysis (L. K. Muthén & Muthén, 2014). The model was evaluated using fit statistics recommended by Keith (2015). Specifically, comparative fit index (CFI) was regarded as adequate fit if values were above .90, and root mean square error of approximation (RMSEA) values less than .08 indicate adequate model fit. Chi-square (χ^2) measures were also included, with insignificant χ^2 scores supporting model fit. However, χ^2 are interpreted with caution, as using χ^2 significance alone is likely to reject models that fit the data well (Keith, 2015). A p -value cut off of .01 was adopted for determining statistical significance of the measurement and structural parameters of the model.

Longitudinal data were examined to evaluate support for the study’s hypothesized model. Longitudinal analysis can provide further support for hypothesized SEM models, as it takes into account changes in measures over time. MacCallum and Austin (2000) highlight the importance of the autoregression function in longitudinal studies, as allowing researchers to measure prior variance in variables; that is, the impact that a previous measure of a variable has on a latter measure of the same variable. By accounting for this, researchers can more confidently confirm the effect size results, as well as the casual hypotheses, from SEM analysis. Through this, longitudinal analysis can help to account for the complex classroom processes that happen over time. Jang et al. (2012) highlight a need for more longitudinal approaches in SDT-focused, classroom-based research in order to better account for the dynamic nature of classrooms. Following this advice, autoregression was modeled in this study through modeling

Table 1. Descriptive statistics of factors from Time 1 and Time 2.

Factor	α		M		SD		Skewness		Kurtosis	
	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2
Psychological Needs Satisfaction	.883	.900	4.39	3.99	1.37	1.48	-0.46	0.01	-0.24	-0.36
Competence	.864	.869	4.36	4.14	1.55	1.61	-0.43	-0.12	-0.53	-0.47
Autonomy	.635	.830	4.16	3.78	1.51	1.70	-0.16	0.10	-0.66	-0.73
Relatedness	.802	.830	4.64	4.04	1.49	1.56	-0.67	-0.19	-0.12	-0.42
Value			3.91	3.65	1.78	1.73	0.01	0.05	-0.93	-0.98
Elective Intention	.887	.958	2.49	2.60	1.71	1.85	1.03	0.95	-0.12	-0.22
Expected Grade			75.83	75.30	19.44	18.01	-1.29	-1.11	1.62	1.44

factors from the dataset of the first wave as predictors of the second wave. This was done to reduce the margin of error in the model and to minimize potential bias between factors.

Results

Descriptive statistics

Descriptive statistics for the factors in the model are displayed in Table 1. Most of the statistics for skewness and kurtosis fit within the appropriate range of ± 1 and none exceeded ± 2 (B. Muthén & Kaplan, 1985). Histograms of latent factor estimates were also analyzed and were deemed to meet the assumption of normal distribution (Field, 2009; Hair, Black, Babin, & Anderson, 2010).

CFA

CFA was conducted before proceeding to SEM to confirm the internal structure of the measures used in the model, as well as their latent correlations. For the longitudinal measures, corresponding absolute factor loadings were held to be equal across time points and covariance between residuals item measures was accounted for (Little, 2013). Fit statistics for the CFA model were deemed acceptable: $\chi^2 = 120.977$, $p = .001$, CFI = .979, RMSEA = .055. Factor loadings are displayed in Table 2. All of the factor loadings met Hair et al.'s (2010) recommendation of $> |.30|$. Reliability scores for all factors were also deemed acceptable for Cronbach's alpha values around or above .70 (Field, 2009; see Table 1). Correlations between variables in the CFA model are displayed in Table 3. All correlations were positive and significant, $p < .01$. These correlations supported the hypothesized model and justified advancing to structural equation modeling.

Longitudinal Structural equation modeling

Model fit. The hypothesized model fit the data well, $\chi^2(df = 90) = 147.045$, $p < .001$, CFI = .972, RMSEA = .059. The longitudinal analysis showed that all factors at Time 2 were predicted by their Time 1 counterparts as expected. The autoregressive correlations ranged from .173 (for value) to .656 (for psychological needs) indicating that the instability across time is a significant factor that may be important to the central hypotheses of the model. Beyond

Table 2. Factor loadings.

Factor/items	Factor loading	
	T1	T2
Elective Intention		
Intention Item 1	.878	.962
Intention Item 2	.754	.883
Intention Item 3	.929	.970
Psychological Needs Satisfaction		
Autonomy Item Parcel	.918	.923
Competence Item Parcel	.811	.863
Relatedness Item Parcel	.781	.830

All factor loadings are significant, $p < .01$. T1 = Time 1, T2 = Time 2.

Table 3. Correlation coefficients of the latent variables.

	1	2	3	4	5	6	7	8
1 Psychological Needs Satisfaction T1	1							
2 Value T1	.732	1						
3 Elective Intention T1	.708	.601	1					
4 Expected Grade T1	.549	.304	.371	1				
5 Psychological Needs Satisfaction T2	.655	.514	.640	.435	1			
6 Value T2	.530	.515	.556	.386	.768	1		
7 Elective Intention T2	.557	.419	.781	.369	.805	.639	1	
8 Expected Grade T2	.523	.342	.411	.680	.554	.452	.480	1

All correlations are significant, $p < .01$. T1 = Time 1, T2 = Time 2.

these autoregressive effects, the model demonstrated evidence for some of the hypothesized relationships. Psychological needs satisfaction was a significant predictor of value ($\beta = .681$, $p < .01$), elective intention ($\beta = .564$, $p < .01$), and expected grade ($\beta = .322$, $p < .01$). Value was not a significant predictor of expected grade ($\beta = .002$, $p = .98$) or elective intentions ($\beta = -.014$, $p = .87$). Expected grade was not significantly correlated with elective intentions ($\beta = .063$, $p = .57$). Indirect effects were not significant from T2 psychological needs satisfaction to T2 elective intention or T2 expected grade via T2 value. Overall, the SEM, including autoregressions, explained 73.7% of the variance in music elective intentions, 60.6% of the variance in students' valuing of music, and 54.1% of expected grade (Figure 1).

Discussion

This study aimed to explore the relationships between students' psychological needs, value, expected grade, and elective intentions toward music as a school subject. It expands on previous research (e.g., Freer & Evans, 2018, 2019) by using longitudinal modeling to examine predictive relationships based on changes over time. Students' psychological needs satisfaction predicted their valuing of music and their elective intentions, but value was not shown to be a significant predictor of elective intention. Thus, Hypothesis 1 was partially supported. The structural model also examined students' expected grades as an outcome of music learning, alongside their

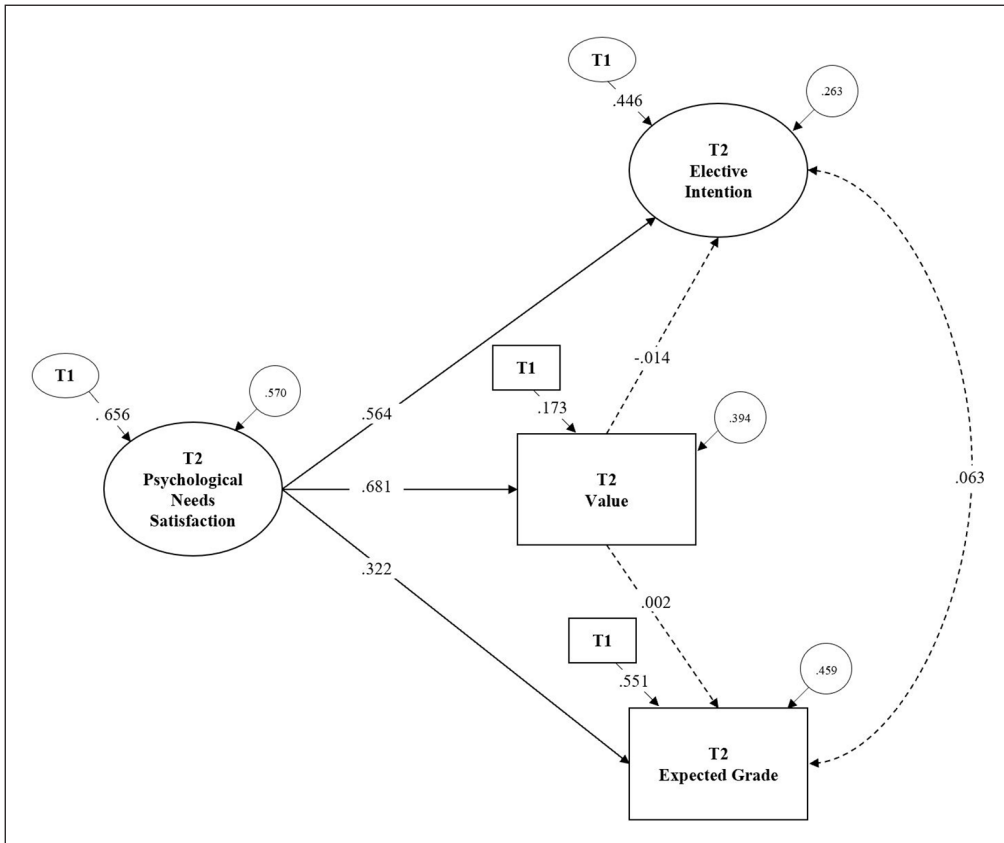


Figure 1. SEM.

Figure 1 results from the Longitudinal SEM analysis. The solid lines represent significant paths ($p < .01$). The dashed lines represent paths that are not significant ($p > .01$).

intentions to continue. Like intentions, expected grades were predicted by psychological needs satisfaction but not by value. Interestingly, expected grades were not significantly related to elective intentions. Thus, Hypothesis 2 was partially supported. The longitudinal aspect of the present study is a particular feature that allows the attribution of changes in elective intentions to changes in psychological needs that occurred over the time in which the study took place. The hypothesized relationships held when taking these autoregressive relationships into account, thus Hypothesis 3 was supported. The final SEM explained 73.7% of the variance in music elective intentions, 60.6% of the variance in students' valuing of music, and 54.1% of the students' expected grade.

The influence of psychological needs

The current results highlight the strong influence that psychological needs satisfaction has on two important educational outcomes in music: elective intention and expected grade. While previous studies have explored these parts separately—the relationship between psychological

needs and elective intention in music (Freer & Evans, 2018, 2019; Evans & Liu, 2019) and psychological needs and expected grade in high school subjects more generally (Badri et al., 2014; Taylor et al., 2014)—the present study offers a broader snapshot of the importance of needs satisfaction. Controlling for changes in intentions over time, needs satisfaction was shown to be a predictor of elective intention at Time 2. This highlights the crucial impact that needs satisfaction in the classroom environment can have on transforming students' perspectives of elective subjects.

In addition, a significant relationship was found between psychological needs satisfaction and students' expected grade. This suggests that students who derived more needs satisfaction in the music classroom had higher perceived performance in the subject. Previous research on students' perceived grades suggests that students who have higher self-efficacy, or perceived estimates of their performance, may have greater motivation for continuing in the activity (Wigfield & Eccles, 2000). This particular relationship (between expected grades and intentions) was not tested as part of the hypotheses; however, the CFA demonstrated no significant correlation, and the correlated residuals of expected grade and elective intention did not reach significance in the final structural model. On a practical level, this suggests that although it might seem that the highest-achieving students are those who are most likely to continue music as an elective subject, a better indicator may be those students who feel that their psychological needs are satisfied, regardless of their actual performance.

Psychological needs satisfaction was also shown to be a significant predictor of value. This aligns with the conceptual process of internalization in SDT (Ryan & Deci, 2017), whereby needs satisfaction enables people to take in the values of their social environments and align them with their sense of self. This finding may offer a potential solution to the previously identified issue of low student value toward music education (Lowe, 2011; McEwan, 2013; McPherson & O'Neill, 2010; Waters et al., 2014). Through exploring a practical application of internalization, teachers may be able to increase their students' value of music by supporting autonomy, competence, and relatedness in the classroom. When value is viewed in this way, it challenges potential perspectives of students who either value or do not value music. These findings highlight that teaching practice may be able to impact the values held by students.

In the hypothesized model, value was expected to be predictive of students' intentions to choose music and of their expected grades. However, these paths did not emerge as significant in the analysis. This differs from Freer and Evans' (2018) results, which postulate value as a mediator of psychological needs' effect on students' elective intention. This unexpected result may be explained by the large effect sizes that psychological needs satisfaction and the previous factor measures at Time 1 had on the corresponding outcome variables. These factors appear to be superior in predicting students' perceptions of classroom music than value. Furthermore, the measure of value was limited to one item measuring importance. Although this item has been used and accepted in other research, a latent measure that captures a greater breadth and dimensionality of the value construct may have played a greater predictive role. In addition, there were measurement differences between this current study and Freer and Evans' (2018) study, such as the previously mentioned value measurement. With this in mind, we suggest caution in interpreting this finding beyond this narrow sample demographic, but it may indicate that to increase students' motivation to continue studying music, teachers may have more success in focusing on the satisfaction of their students' psychological needs through their daily experiences in music learning, rather than directly targeting students' beliefs and values about the subject.

An important contribution made by this study is the use of a longitudinal design. Longitudinal designs are important in correlational research because of the need to account for prior variance in the variables of interest. For example, previous research (e.g., Evans & Liu, 2019; Freer & Evans, 2018, 2019) has found that at a single time point, psychological needs satisfaction was predictive of students' intentions to study music, but the ability to infer this causal relationship is limited. It should be noted that this in itself does not provide evidence for causality, but incorporating the dimension of time in the analysis does enable more precise attribution of changes in elective intentions to changes in psychological needs between Time 1 and Time 2. Although more sophisticated longitudinal designs are possible (e.g., those that include multiple cohorts, or measures taken at more than two time points that can allow for cross-lagged and longitudinal mediation effects), the present study adds to the existing literature by accounting for prior variance in the dependent variables of interest.

Limitations and implications for future studies

This study has highlighted the broad significance of psychological needs satisfaction in music studies, regarding both enrolment intentions and expected grades. It is important to address some limitations of the study and to discuss possible research directions for future studies.

First, the students in the present study were all male. Studies into value have found that gender can affect students' value toward activities and subjects (Eccles et al., 1998; Eccles & Harold, 1992; McPherson et al., 2015). In particular, female students have been shown to value music more than males (McPherson & O'Neill, 2010). In relation to needs satisfaction, gender can play a role in the overall amount of needs satisfaction experienced (Chen et al., 2015; McPherson & O'Neill, 2010) and the amount of needs-support that students perceive their teachers (Lietaert, Roorda, Laevers, Verschueren, & De Fraine, 2015) and parents (Guay, Sénécal, Gauthier, & Fernet, 2003) provide. In addition, the experience of needs satisfaction or frustration can influence males and females in different ways (e.g., Bonneville-Roussy et al., 2017). Future studies should therefore not only include representative samples of male and female students but also examine how these findings may be invariant or otherwise as a function of gender.

Second, the present study only included students from one school, which limits the generalizability of the findings. The school was a single, independent, all-boys school, and thus these findings are only particular to this setting. Furthermore, the demographics of the sample are similar to those in the Freer and Evans (2018) study, providing support for the findings in demographics with these particular characteristics, but limiting the generalizability of both studies. In addition, the elective subjects available at a school may influence factors in this model, as the number of subjects that students value and the number of elective options available may influence students' subject choices (Hawkinson, 2015). Furthermore, the school of this current study had a higher than average SES which can have an influence on the value that students place on music studies (McPherson et al., 2015). Therefore, it is recommended that future studies investigate schools with a range of SES levels to further investigate the generalizability of the current findings.

Third, the age of the students is another limitation to be considered in this current study. Age may impact the relationship between value, elective intention, and expected grade. Expectations of success and utility value become more important to students' choices as they become older (Wigfield et al., 1997). Participants in this study were in both Year 7 and Year 8. This may influence the results because of developmental changes that occur during this time period (Wigfield, Eccles, Schiefele, Roeser, & Davis-Kean, 2006). However, other research in the area of music

and elective choice (Freer & Evans, 2019) tested this using multiple group analysis and found that there were no differences between levels of motivation and influence of motivation on elective choice between Year 7 and Year 8. Future studies could investigate students' elective choices when they are entering their final years of school. Expected grade may have more influence in these later years, as many students are trying to optimize their academic grades to receive entry into university or in preparation for a career. In addition, students may hold lower value toward certain subjects as they grow older, such as music (Koh, 2011). Age may therefore be a significant factor to consider in future studies.

Fourth, future studies may investigate a similar process in other school subjects. Subject-specific interventions to enhance motivation and engagement may be more effective than global efforts across all subjects (Green, Martin, & Marsh, 2007). Future studies could therefore examine elective intentions toward other KLAs. For example, it may well be that when value for a subject is high (as in mathematics because it is generally perceived as important and useful for a future career), students will choose it regardless of the degree of psychological needs satisfaction they experience within that subject.

Implications for teachers

This research highlights the importance of nurturing students' psychological needs. Needs satisfaction has been shown to be influential on students' value, expected grades, and elective intentions. Teachers of non-compulsory subjects often need to consider both their enrolment numbers and the academic achievement of their students in order to successfully run their KLAs. To help achieve this, there are a range of strategies teachers can utilize to support psychological needs satisfaction (Evans, 2015).

To support autonomy, research has demonstrated the benefits of teachers adopting autonomy-supportive teaching styles (Leptokaridou, Vlachopoulos, & Papaioannou, 2016). Strategies to do this include explaining the reasoning behind lesson activities, allowing students the time they need to complete tasks, using empowering language that gives agency to students, and allowing students to express negative reactions to tasks (Evans, 2015; Reeve, 2009). Furthermore, Waters et al. (2014) posit the importance of students reflecting on the usefulness of their studies. To support students' sense of competence, teachers can help students to make connections between students' efforts and their outcomes. Alongside this, teachers should reduce praising students for fixed abilities or as a way of controlling students, and rather praise students in ways that support their autonomy and help students to feel efficacious. Relatedness and students' sense of belonging have been shown to affect students' motivation toward school (Allen, Kern, Vella-Brodrick, Hattie, & Waters, 2016; Ryan & Deci, 2017; Sparks, Dimmock, Lonsdale, & Jackson, 2016). To support relatedness, teachers need to develop relationships with their students. Sparks et al. (2016) posit the importance for teachers to display interest, warmth, and support toward their students to build positive relationships. In addition, relatedness-supportive classrooms should give students opportunities to interact with and learn from their peers, and should be supported by parents at home. Through nurturing inter-relationships between students, parents, and peers, teachers can support their students' sense of relatedness.

Conclusion

This research sought to explore factors that influence the elective intentions and expected grades of high school students toward music. Following Freer and Evans' (2018) research, this

study demonstrates the importance of the satisfaction of psychological needs in order to nurture value toward a subject. Psychological needs satisfaction is also a strong predictor of students' intention to continue studying music and their expected grades, which are strong indicators of actual academic achievement. The key contribution of this study is the longitudinal nature of the modeling used, which can provide greater confidence in the predictive relationships estimated due to modeling prior variance in the outcomes. This study therefore posits that the satisfaction of psychological needs is influential for both increasing students' intentions to continue studying music, as well as their achievement in music.

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ORCID iD

Paul Evans  <https://orcid.org/0000-0001-8731-0973>

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