Being bored at school : trajectories and academic outcomes

Being Bored at School: Trajectories and Academic Outcomes

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Abstract

The emotion of boredom is commonly experienced by students. Nevertheless, hardly any research has focused on the evolution of this emotion over time by also considering individual differences. The aim of this study was to identify groups of students with different trajectories of boredom over a school year, and compare these profiles on academic achievement, motivation and intention to drop out. Participants were 546 students (55% male, 94% born in Italy, M_{age} = 14.24, SD_{age} = .53). We found four trajectories of boredom: starting not bored and (a) increasing, or (b) rearing up; starting bored and (c) decreasing, or (d) maintaining. Trajectories of boredom were related to academic outcomes both at the beginning and at the end of the school year, with students showing a steep increase reporting the most detrimental outcomes. The results are discussed in terms of their educational and practical implications, as they emphasize the need to pay attention to an emotion that is often overlooked in the school context.

Keywords

Boredom; Academic outcomes; Motivation; Intention to drop out; Latent growth curve model

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The emotion of boredom is commonly experienced by students. Nevertheless, hardly any research has focused on the evolution of this emotion over time by also considering individual differences. The aim of this study was to identify groups of students with different trajectories of boredom over a school year, and compare these profiles on academic achievement, motivation and intention to drop out. Participants were 546 students (55% male, 94% born in Italy, M_{age} = 14.24, SD_{age} = .53). We found four trajectories of boredom: starting not bored and (a) increasing, or (b) rearing up; starting bored and (c) decreasing, or (d) maintaining. Trajectories of boredom were related to academic outcomes both at the beginning and at the end of the school year, with students showing a steep increase reporting the most detrimental outcomes. The results are discussed in terms of their educational and practical implications, as they emphasize the need to pay attention to an emotion that is often overlooked in the school context.

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Being Bored at School: Trajectories and Academic Outcomes

In the last two decades, educational research has increasingly recognized the importance of emotions for learning processes and academic outcomes (Pekrun, 2017). However, while some emotions, like anxiety (Pekrun et al., 2002), anger and enjoyment (Pekrun et al., 2017), have mostly received researchers' attention, the impact of feeling bored in the school context has remained a relatively underexplored issue (Tze et al., 2016). This is quite surprising as existing studies have shown that boredom is an emotion often experienced in educational settings by adolescents (Martz et al., 2018) from several countries and at different school levels, from middle (Larson & Richards, 1991) to high school (Nett et al., 2011), and on to university (Mann & Robinson, 2009). Even more importantly, boredom has consistently been found to be associated with lower academic achievement and motivation (Pekrun, 2017; Tze et al., 2016). Based on these premises, the aim of this study was to identify students' profiles differing in the levels of boredom over the course of a school year, and to compare these profiles on academic achievement, motivation and intention to dropout from school.

1.1. Boredom as an Achievement Emotion

Boredom is a non-trivial emotion with relevant implications on behaviour, cognition (Bench & Lench, 2013) and mental health (Eastwood et al., 2012). It manifests with low attentional engagement in an environment perceived as unsatisfactory (Eastwood et al., 2012), and has the regulatory function of motivating individuals to move out of such an environment (Elpidorou, 2018). Further, it can be distinguished in *boredom proneness*, that is, the individual tendency to experience boredom in various situations, and *state boredom,* that is, the experience of boredom in a specific situation (Elpidorou, 2014).

The focus of this study is on the experience of state boredom in the learning environment. In this context, among other perspectives (Belton & Priyadharshini, 2007), boredom is considered as an achievement emotion, and specifically as an activity-related emotion, with negative valence and

deactivating effect, arising when both the control over the activity and the value of the task are perceived as low (Control-Value Theory, CVT, Pekrun, 2006, Pekrun & Perry, 2014). In other words, students feel bored when they perceive they have little power over a learning activity, the results of which are considered of little importance. Besides control and value, contextual factors also contribute to the arising of boredom (Pekrun et al., 2007). For instance, boredom is influenced by the level of performance achievement in the classroom (Holm, Korhonen et al., 2020) and, for students needing special education support, by the opportunity to attend classes in general classrooms or separate self-contained ones (Holm, Bjorn et al., 2020).

While widespread in the literature (Vogel-Walcutt et al., 2012), the assumption of boredom as a deactivating unpleasant emotion is not without controversy, as there are also findings linking it to heightened arousal (Goetz et al., 2014). To address these inconsistencies, Elpidorou (2018) suggested that boredom may be related to high or low arousal, depending on the effort of the individual to reach an optimal state of arousal for the situation. By and large, the picture concerning state boredom in educational settings is complex and multifaceted, with most empirical findings suggesting that it is a silent and covert emotion (Goetz et al., 2014; Pekrun et al., 2010), and this may be one of the reasons why it has largely been neglected in the literature on emotions (Pekrun et al., 2002).

A further line of inquiry, still sparse in the literature, focuses on the evolution of academic boredom over time. Ahmed and colleagues (2013) reported that, in a sample of 7th grade students, boredom had an average increasing trajectory over the course of a school year, and a similar increasing trend was found by Vierhaus and colleagues (2016) over several elementary school years. The same result was also found in a study on university students (Tze et al., 2014), showing a significant linear increase in boredom during a semester, associated with a parallel decrease in dedication. These studies are relevant as they highlight the importance of monitoring the development of academic boredom over time. Nonetheless, they neglect the possible role of individual differences which could be grasped by exploring the possible co-existence of different

trajectories in such an evolution. The importance of better understanding academic boredom is supported by a number of studies showing the impact of this emotion on academic outcomes.

1.2 Boredom and Academic Outcomes

A meta-analysis by Tze and collaborators (2016) provided evidence of a negative relation between boredom and several academic outcomes, such as achievement and motivation. This relation was stronger for secondary students as compared to university or college students – although only seven of the total 35 effect sizes analysed were related to that age group – and for class-related boredom as compared to learning-related boredom. In this study, we focus in particular on three academic outcomes, i.e., achievement, motivation and drop-out.

The correlational findings by Tze and colleagues (2016) consistently indicated a negative association between boredom and academic achievement. Moreover, several longitudinal studies have provided further information on the relations between these two variables. Two studies (Daniels et al., 2009; Pekrun et al., 2010) found that over the course of an academic year boredom had a negative impact on the final course grade for university students, even when controlling for prior achievement. Also, boredom proneness was found to negatively impact grades (Mugon et al., 2020). Furthermore, some authors (Pekrun, 2006; Pekrun & Perry, 2014) advanced the assumption of a reciprocal influence between boredom and academic achievement, suggesting that boredom may negatively affect grades, which may in turn lead to increased boredom, thus sustaining a detrimental vicious cycle. Three longitudinal studies conducted on university (Pekrun et al., 2014), primary and secondary school students (Pekrun et al., 2017; Putwain et al., 2018) confirmed this reciprocal association.

As far as motivation is concerned, this variable was also found to be negatively associated with boredom in correlational investigations (Tze et al., 2016). However, to the best of our knowledge, very few longitudinal studies have been conducted to confirm the relation between boredom and motivation (e.g., Peixoto et al., 2016). A relevant insight in this direction comes from the work conducted by Sutter-Brandenberger and colleagues (2018), one of the first combining

Self-Determination Theory (SDT; see Ryan & Deci, 2017) and CVT frameworks. By considering the distinction between the types of motivation, from extrinsic to intrinsic, posited by SDT, the authors explored in a sample of secondary school students the reciprocal effects between self-determined motivation and three unpleasant emotions (i.e., anxiety, anger and boredom) over time. The results showed negative effects of all three investigated emotions on self-determined motivation, and a single reciprocal negative effect from the latter on boredom.

Fewer studies have considered the links between boredom and school dropout. Given the number of dropouts both in Italy (Longobardi et al., 2016; MIUR, 2019) and elsewhere (Cohen & Smerdon, 2009) and the consequences of this phenomenon on the lives of youngsters, this is a serious public health issue (Freudenberg & Ruglis, 2007; De Rdder et al., 2013) which requires a better understanding. Among the few existing studies, Bearden and colleagues (1989) found that boredom was one out of the nine most often mentioned reasons for dropping out from high school. More recently, boredom was found to longitudinally predict dropout in 14-year-old students (Wegner et al., 2008), and state boredom was found to be strongly associated with intention to quit upper secondary school (Tvedt et al., 2021).

1.3 Rationale and Aims of the Present Study

Research on boredom, while neglected in the past (Pekrun et al., 2002), has been growing in more recent years, with correlational and longitudinal research providing empirical evidence that this emotion tends to increase over time, with detrimental effects on academic outcomes (Ahmed et al., 2013; Putwain et al., 2018; Tze et al., 2016). Nonetheless, there are some gaps in the literature that warrant further investigation. First of all, while most research was conducted on university students, a meta-analysis (Tze et al., 2016) evidenced that boredom, especially when class-related, has more negative effects on academic outcomes in secondary school students. Moreover, among the few longitudinal studies (Pekrun, 2017), even fewer have provided information about the tendency towards growth over time in the experience of boredom (Ahmed et al., 2013), and none have explored differences in academic outcomes among students with various trajectories of

boredom. Finally, research has mostly overlooked the associations of boredom with an important academic outcome, that is, school dropout. In the present study, we have addressed these gaps by identifying groups of secondary school students experiencing different trajectories of boredom over the course of a school year, and then searching for group differences in three academic outcomes, namely achievement, motivation, and intention to drop out, measured at the beginning and at the end of the school year.

The specific study aims were three. First, we explored the average trajectory of class-related state boredom in a population of secondary school students over a school year. On the basis of previous literature, we expected a linear tendency towards increase with time in the mean levels of academic boredom (Ahmed et al., 2013; Tze et al., 2014). Secondly, we searched for groups of students with different trajectories of boredom from the beginning to the end of the school year. The limited knowledge on this issue does not allow us to advance specific hypotheses. However, along with expecting a general tendency towards increase (Ahmed et al., 2013), considering the role of individual characteristics in the experience of boredom (Frenzel et al., 2007; Pekrun, 2006; Tze et al., 2014) we also predict that the level of increase may be different in the various groups, with some students showing a steep increase and others presenting a smoother evolution. For the first and second aims, we further controlled the role of gender in predicting students' trajectories of boredom, as previous studies have found that girls tend to report lower boredom than boys (Pekrun et al., 2014; Pekrun et al., 2017). Thirdly, we compared students with different trajectories of boredom on academic achievement, motivation and intention to drop out, measured at the beginning and at the end of the school year. On the basis of previous literature (Pekrun, 2017; Tze et al., 2016) showing negative associations between boredom and academic outcomes, we expected students with higher levels of boredom to report lower achievement and motivation and higher intention to drop out from school both at the beginning and at the end of the school year. As individual trajectories had never been tested before in terms of associations with academic outcomes, we did not make specific predictions. However, on the basis of previous literature (Tze et al., 2014), we

advanced that students experiencing a steeper increase in boredom would also show lower levels of academic achievement and motivation, and higher intention to drop out as compared to other students, especially at the end of the school year, while a smoother increase would be associated with less negative outcomes.

2. Method

The data for this study were taken from a larger longitudinal research conducted on a population of secondary school students, which has been involved in three previous studies. The first study examined the reciprocal longitudinal effects between interpersonal justice, student engagement, agency, and anger (Authors, 2020a); the second focused on profiles of agency, anger, and enjoyment and their relation to academic achievement and intention to drop out (Authors, 2020b); the third examined teacher autonomy support and interpersonal justice in relation to personal responsibility (Authors, 2020c).

2.1 Participants and Procedure

The study's participants were 546 students (55% male, 94% born in Italy, M_{age} = 14.24, SD_{age} = .53) enrolled in 31 9th grade classes. To recruit the students, we sent out invitation e-mails to the principals of a number of secondary schools of two medium-sized cities located in Northern Italy, Emilia-Romagna region. Three schools (a high school, a technical school and a vocational school) responded and agreed to participate in the longitudinal study. During school hours and by means of an online platform on school computers, data were collected in three waves: during the first month of the 2018-2019 school year (T1), in the middle term (T2), and during the last month of the same school year (T3). At all times, a researcher was present during the administration and compiling of the questionnaire, to brief students and to answer questions. The participants were present for all three data collections.

Participants were informed as to the study aims, the confidentiality of their answers and voluntariness of participation, and they gave their consent prior to completing the questionnaire. Informed consent from both parents was also collected before the first data collection (with about

2.2% of the families refusing). In order to collect class-related boredom and outcomes, students were asked to answer all scales by referring to their experience in a specific subject (literacy, math or English as second language) and with that specific teacher. Students were randomly assigned to one subject/teacher, which remained the same from T1 to T3. The research was conducted in agreement with the ethical norms of the Italian National Psychological Association and got the approval of the local Ethics Committee.

2.2 Measures

2.2.1 Boredom

The emotion of boredom was assessed at T1, T2 and T3 with a scale from the Achievement Emotions Questionnaire (AEQ, Pekrun et al. 2011). The original questionnaire measured several emotions both in the classroom context and in the individual learning activity. For this study, we used the 3-item scale measuring the emotion of class-related boredom. In agreement with the authors, we made a small change to the items, so that they referred specifically to the subject randomly assigned to each participant (sample item: "I can't concentrate during *subject* classes because I feel so bored"). Participants answered each item on a scale ranging from 1 (Not at all) to 7 (Absolutely yes). In this study, the scale showed good internal consistency at all three times (Cronbach's alphas were.83, .86, .85, respectively).

2.2.2 Academic Achievement

Achievement was assessed at T1 and T3 with a single item. On a scale ranging from 1 to 10 (as the one used in every Italian school to grade students), participants were asked to indicate, at T1, the final grade they achieved in the assigned subject at the end of the previous school year[2] (when they were in middle school), and at T3 the final grade they achieved in the randomly assigned subject at the end of the current school year. As previous studies indicated that students' self-reported marks tend to reproduce their actual marks quite accurately and thus can be considered

[2] The choice to ask for the grade dating back to the end of the previous school year was due to the fact that in T1 – that is, in the first weeks of secondary school – most of the students had not yet received any evaluation in any subject.

reliable (Kuncel et al., 2005), we preferred to use a self-report measure that guarantees student anonymity rather than rely on official reports.

2.2.3 Motivation

Motivation was assessed at T1 and T3 by means of the Italian validated version (Alivernini & Lucidi, 2008) of the Academic Motivation Scale (AMS; Vallerand et al., 1992). Based on the framework of the Self-Determination Theory (Deci & Ryan, 2000), AMS assesses students' motivation in a continuum from extrinsic to intrinsic. Starting from the stem "Why do you go to high school?", the scale comprises five 5-item subscales, of which four were used for this study: Amotivation (item sample: "I really feel that I am wasting my time at school"), External regulation (item sample: "In order to get a more prestigious job later on"), Identified regulation (item sample: "Because I think that a high-school education will help me better prepare for the career I have chosen") and Intrinsic regulation (item sample: "Because I experience pleasure and satisfaction when learning new things"). Overall, the four scales showed a good reliability across the two waves of data collection: for Amotivation, *a*s of .84 (T1) and .89 (T3); for External regulation, *a*s of .84 and .84; for Identified regulation, *a*s of .75 and .81; for Intrinsic regulation, *a*s of .89 and .88. As suggested in the Italian validation of the measure (Alivernini & Lucidi, 2008), in order to reduce the number of variables considered for the scope of the present study, we relied on the Relative Autonomy Index (RAI; Vallerand & Ratelle, 2002), a sum of weighted scores integrating information from the four motivational dimensions described above into a single overall score.

2.2.4 Intention to Dropout

Participants' intention to drop out[3] was assessed at T1 and T3 with a 3-item ad-hoc scale. One item, referring to the general intention to leave school ("I often consider dropping out from school"), was taken by Vallerand and colleagues (Vallerand et al., 1997). To this, we added two

[3] We assessed intention to drop out and not the actual dropout rate because in Italy education is compulsory until the age of sixteen, and the study participants were younger. In Italy, when a student drops out at an age when school is still mandatory, s/he generally moves to a lower, less prestigious, track, with fewer chances to go on to university paths or pursue high profile careers (Contini & Scagni, 2013).

items assessing the intention to change school: "I have doubts about whether this is the right school for me" and "I think I might decide to change school". Participants answered each item on a scale ranging from 1 (Not at all) to 7 (Absolutely yes). As the measure was built ad-hoc, we tested its factorial structure with a confirmatory factor analysis model including six items and two intercorrelated expected factors (intention to dropout at T1 and at T2). Model fit was good (MLR χ^2 (7) = 8.49, p = .291; CFI = 0.99, RMSEA = 0.020, 90% CI [.000, .059], SRMR = 0.016). Each item loaded significantly (p < .001) on the factor it was conceived to represent, with standardized factor loadings ranging from .676 to .922. Cronbach's alphas for the scale were .77 at T1 and .85 at T3. Moreover, we further tested the scale internal consistency with composite reliability scores (ω; Dunn et al., 2014) obtaining good results (ω = .78 at T1 and .85 at T3).

2.3 Data Analyses

Prior to addressing our aims, we tested configural, metric and scalar longitudinal measurement invariance for the boredom variable, by subsequently constraining factor loading structure, factor loadings and intercepts to be equal across waves. Invariance was considered supported if deterioration in model fit was within the cut-off values of ΔCFI < -.010 and ΔRMSEA < .015 and ΔSRMR < .010 (Chen, 2007). To explore the average trajectory of the emotion of boredom over the course of the school year, from T1 to T3, we estimated a latent growth curve model using the Mplus 8 software (Muthén & Muthén, 2009). This model allowed us to test whether the average change in the emotion and the variation among participants were significant. We also controlled for the role of gender in predicting the trajectory of boredom by including it as time invariant covariate in the latent growth model. Then, to examine whether multiple different trajectories could be identified, we used latent growth class analysis. We tested two to five class solutions and compared them using several indices to identify the best-fitting model. First, we compared the Bayesian Information Criterion (BIC), a criterion that emerged as very well-performing in a recent simulation study (Nylund et al., 2007). Lower BIC values are preferred as they indicate a better fit of the model. Furthermore, we considered entropy values as an indication

of classification accuracy: entropy values closer to 1 are desired, as they indicate a clearer distinction of classes (Muthén, 2004). Lastly, the Vuong-Lo-Mendell-Rubin Likelihood Ratio Test (VLMR-LRT) was computed for each model: this test should be significant, indicating that, in the comparison of models, adding one class improves the fit. To control the role of gender as possible predictor of latent class membership, we conducted a multinomial logistic regression. Lastly, to compare different classes on academic achievement, motivation and intention to drop out, we used the 3-step approach on Mplus (Asparouhov & Muthén, 2014) to test differences across classes at the beginning and at the end of the school year (T1 and T3, respectively), while controlling possible measurement errors in the identification of profiles. All models were estimated with the maximum-likelihood with robust standard errors estimator (MLR) and the full information likelihood method (FIML) was used to deal with missing data (6.2% at T1, 1.6% at T2, and 5.3% at T3). The "Type = Complex" analysis, provided by the Mplus software, in conjunction with the "cluster" command were used to obtain corrected standard errors estimates and account for the clustering of participants in classes, reducing the possibility of Type 1 errors (McNeish et al., 2016).

3. Results

3.1 Preliminary Analyses

The configural invariance model showed acceptable fit to the data, with χ^2 (24) = 111.53, p =.000, CFI = .95, RMSEA = .08 and SRMR = .03. The loss of fit was within cut-off values for both metric (ΔCFI = -.003, ΔRMSEA = -.003, ΔSRMR = .001) and scalar invariance (ΔCFI = -.003, ΔRMSEA = -.003, ΔSRMR = .001) supporting longitudinal measurement invariance for our data. Descriptive statistics and correlations among variables are presented in Table 1. Inspection of the mean values reported in Table 1 shows that boredom increased regularly from T1 to T3, academic achievement and motivation decreased from the beginning to the end of the school year, and intention to drop out increased. All outcome variables were correlated with boredom and among themselves, with two exceptions. First, academic achievement at T1 (referred to the final grade

achieved by participants at the end of middle school) did not correlate with boredom at T3. Second, intention to dropout at T1 did not correlate with academic achievement at T1.

3.2 Average Trajectory of Boredom

The latent growth model estimated to explore the average trajectory of boredom over the course of the school year showed good fit to the data (MLR$\chi^2(2) = 2.34$, $p = .310$, RMSEA = .018, 90% CI [.000 - .089], CFI = .999, SRMR = .009). Our participants reported a latent intercept, the mean level of boredom at T1, of B(SE) = 2.66 (.09). The mean of the latent slope (B(SE) = .24 (.05), $p = .000$) indicated that on average boredom increased significantly from T1 to T2 and T3. The latent intercept and slope were negatively correlated ($r = -.25$; $p = .009$), revealing that students who started school with higher levels of boredom experienced a less steep increase. Including gender as time invariant covariates in the latent growth model, we found that girls reported lower initial levels of boredom, i.e., the latent intercept (B(SE) = -.12 (.04), $p = .005$), but no significant difference was found in the change over time, i.e., the latent slope (B(SE) = .10 (.07), $p = .128$). After controlling for the role of gender, both the estimated latent intercept and slope showed significant residual variance at $p < .001$. These findings indicate that there were significant inter-individual differences both in the initial levels and in the change over time of the emotion, supporting the importance of exploring the existence of different trajectories.

3.3. Different Trajectories of Boredom

Fit indices for the estimated two to five latent classes solutions are reported in Table 2. BIC values decreased up to the five-classes model, with a smaller decrease from the four to five-classes model. Entropy values suggested a decrease in classification accuracy from the two to three-classes model, an increase when adding the fourth class and then another decrease with the addition of the fifth class. As suggested by previous literature (Nylund et al., 2007; Muthén, 2004; Bayram Özdemir & Özdemir, 2020), we selected the model with lowest BIC and highest entropy value, that is, the four classes model. The VLM-LRT for this model reported a $p = .082$, while it should ideally have been < .05; however, as the other information criteria consistently supported the four-classes

model as the best fitting, this solution was chosen. The best loglikelihood value for this model (-2689.81) was replicated in several final stage solutions, supporting this as a good solution.

The latent intercepts and slopes for each of the four classes are shown in Table 3 and the different boredom trajectories are represented in Figure 1. The first class, which we labelled *Starting not bored and increasing* (↗[4]), included 309 students (56.3%); the second, called *Starting not bored and rearing up* (⇗), included 87 students (16.7%). Students in both these two classes showed initial levels of boredom below the average latent intercept (B = 2.66, SE = .09), but differed in their trajectories, as those in the second class experienced a notable increase while the increase was less steep, albeit significant, for those in the first class. The third class, called *Starting bored and decreasing* (↘), included 96 students (18%) who started school with high levels of boredom and, contrary to the other classes, reported a small but significant decrease. Lastly, the fourth class, labelled *Starting bored and maintaining* (↦), included 47 students (9%) whose levels of boredom were high at the beginning and remained high through the whole school year (the latent slope was not significant). The multinomial logistic regression showed that gender was significant only in the comparison between the first (↗) and third (↘) classes, with girls more likely (B(SE)= .54 (.24), p = .023) to belong to the first.

3.4 Comparison of Classes on Academic Achievement, Motivation and Intention to Drop Out

Using the 3-step approach, we conducted a series of t-tests to compare classes on academic achievement, motivation and intention to dropout at the beginning and at the end of the school year, while also considering possible measurement errors in the identification of the classes. Results are reported in Table 4.

Academic achievement. Students whose levels of boredom were low at the beginning and moderately increased (class 1, ↗) reported to have achieved significantly higher marks in the previous year as compared to students in class 3 (↘) and class 4 (↦), with no significant

[4] For each profile, we used labels and symbols in the Results section to improve legibility.

differences with respect to class 2 (⇗). At the end of the school year, their marks were significantly higher than those of all the other classes: class 2 (⇗), class 3 (↘) and class 4 (↦).

Motivation. At T1, students in classes 1 (↗) and 2 (⇗), reporting low starting levels of boredom, showed higher levels of motivation as compared to students in class 4 (↦), and did not differ between them. Motivation for students in class 1 (↗) was also significantly higher as compared to students in class 3 (↘). At T3, a general loss of motivation for all classes was observed, with the scores of students in class 2 (⇗) dropping to the point that they did not differ from those of classes 3 (↘) and 4 (↦). Students with only moderately increasing levels of boredom (class 1, ↗) were instead more motivated at the end of the school year as compared to students in class 2 (⇗), class 3 (↘) and class 4 (↦).

Intention to drop out. Students in class 1 (↗) started the school year with lower intentions to drop out with respect to all other classes: class 2 (⇗), class 3 (↘) and class 4 (↦). These differences remained at the end of the school year. While all dropout scores increased at T3, the students whose levels of boredom reared up over the year (class 2, ⇗) registered the steeper rise, becoming significantly higher as compared to the students in class 4 (↦).

4. Discussion

In the light of the assumption that individual differences play an important role in the experience of achievement emotions (Pekrun, 2006), the general aim of this work was to analyse the evolution of boredom over a school year and the differences in academic outcomes of secondary school students with various trajectories. Indeed, our findings provided evidence that students reported different trajectories, i.e., with boredom increasing more or less steeply, decreasing or remaining stationary. Moreover, these trajectories were associated to varying levels of academic achievement, motivation and intention to drop out. The key findings and educational implications are discussed below.

4.1 The Average Trajectory of Boredom over Time

Our findings on the mean trajectory of boredom, which was observed to increase over the course of the school year, were consistent with those of previous research on younger (Ahmed et al., 2013) and older (Tze et al., 2014) students. This result is not to be overlooked, as it signals that school is not able to buffer the onset of this negative emotion: on average, going to school is boring for many students and becomes even more unpleasant as the months pass. Notably, however, and more interestingly for the purposes of this study, we also found a significant variance among students that supported our prediction about the importance to trace different trajectories of boredom.

By including gender as a time invariant covariate in the latent growth model, we found that in line with previous findings (Pekrun et al., 2014; Pekrun et al., 2017) female students experienced lower levels of boredom at the beginning of the school year than boys. However, there was no significant variance between girls and boys in the average rate of change over time. This means that, while girls on average experienced less boredom when entering school, both boys and girls reported the same general increasing trend over time.

4.2 Different Trajectories of Boredom

The analysis of latent classes showed that four different trajectories of boredom were represented by our student population, allowing us to detect a nuanced picture of academic boredom. This result is relevant and innovative, as it reveals that the simple analysis of the average trend of boredom does not represent the whole student population and is not sufficient to grasp the multiple and varied student experiences. About one-fourth of the students involved in this study (Classes 3 and 4) reported high levels of boredom already after a few weeks of school. Among them, a limited number (class 4) experienced high levels of boredom throughout the year. As these students were not detected in former studies finding a general increasing trend in boredom (Ahmed et al., 2013), future studies are needed to delve deeper into this result and inquire about the role of other factors (e.g., perception of the learning environment, boredom proneness) in maintaining high levels of boredom throughout the school year. Even more interestingly, students in class 3 reported

high levels of boredom at the school start and a significant decrease over time. This is a very original finding, indicating for the first time the existence of a trajectory different from the average increasing trend that so far has been considered applicable to all students (Tze et al., 2014; Vierhaus et al., 2016). Our data do not allow us to explain the reasons why students reported this decreasing trend. However, considering perceived control and value as the bases for the arousal of achievement emotions (Pekrun, 2006), we can advance that these students may have found in their learning environment more positive stimuli than expected at the beginning of the school year. Further research will be needed to replicate this finding and better understand its correlates.

Our findings also showed that the majority of students entered school with low levels of boredom (classes 1 and 2) and, consistently with previous literature (Ahmed et al., 2013), reported a significant increase in boredom. However, over the year they took two different trajectories. For most students (class 1), the increase was moderate and boredom remained on relatively low levels, while for others (class 2) it was more intense. This steeply increasing trajectory is another innovative finding that was not detectable with the analysis of average trends (Tze et al., 2014). Unlike the students in classes 3 and 4, we can figure out these adolescents as starting secondary school with an attitude of openness and interest towards the lessons, which over the course of the year turned sharply towards a feeling of monotony. Understanding the processes behind this change deserves the attention of both researchers and teachers, as many factors may be involved. Within CVT's framework (Pekrun, 2006), it is possible to suppose that over time these students experienced low levels of perceived control and value in their learning activities, leading to the arousal of this negative emotion. Previous findings on the reciprocal effects between achievement emotions and outcomes (Pekrun et al., 2017; Putwain et al., 2018; Sutter-Brandenberger et al., 2018) also suggest that these students may experience a vicious cycle reinforcing and accelerating itself.

The results of the multinomial regression analysis on the latent growth classes with gender as predictor showed no differences between girls and boys in the likelihood of belonging to almost

all classes. The only exception was a higher likelihood for girls of belonging to the *Starting not bored and increasing* class, characterized by the lower levels of boredom, rather than the *Starting bored and decreasing* class. This finding supports previous literature (Pekrun et al., 2017) suggesting that girls tend to experience a less maladaptive profile as compared to boys, but more research is required in this direction.

4.3 Class Comparisons on Academic Outcomes

Overall, as expected and in line with previous studies (Tze et al., 2016), the more students felt bored, the more they reported lower achievement, lower motivation, and higher intention to drop out from school (Bearden et al., 1989). Nevertheless, with the caution due to the fact that our analyses do not allow us to infer causal relations between variables, some new insights have been provided by comparing students with different boredom trajectories.

As for academic achievement, our results are consistent with those of previous studies (Putwain et al., 2018; Tze et al., 2016) showing a negative vicious cycle between boredom and academic performance. By and large, all students reported a fall in the grades they achieved from the school beginning to the end, with the students presenting the steepest increase in boredom also suffering the greatest drop, while the students with lower levels of boredom throughout the year showed better results both at the beginning and at the end of school.

A similar trend was found for student motivation. All groups reported lower scores at the end of the year compared to the beginning, thus confirming a worrying albeit already described (Eccles & Roeser, 2011) pattern. In line with previous correlational (Tze et al., 2016) and longitudinal (Sutter-Brandenberger et al., 2018) investigations revealing a negative association between boredom and motivation, the comparison between groups with low initial boredom revealed that they started the school year with similarly high motivation, but at the end the students experiencing the steepest increase in boredom also reported a much lower motivation level as compared to the students with different trajectories. These findings, consistent with the trend already discussed on academic achievement, highlight the association between a sharp increase in

boredom and detrimental outcomes, in line with CVT's assumption of a reciprocal influence between boredom and academic outcomes (Pekrun, 2006; Pekrun & Perry, 2014). A further consideration on the association between boredom and motivation can be advanced in relation to the group with decreasing boredom. Indeed, these students also reported the smallest drop in motivation as compared to profiles with stable or increasing boredom. Consistently with previous studies (Sutter-Brandenberger et al., 2018), this finding supports the existence of a reciprocal relation between motivation and boredom.

Our findings on the intention to drop out were consistent overall with theoretical works attributing to boredom the regulatory function of motivating individuals to move out of unsatisfactory environments (Elpidorou, 2018), as the classes with higher levels of boredom also reported the higher intentions to drop out. Students in the *Starting not bored and rearing up* class, while showing a sharp drop in academic achievement and motivation, were also the ones with the highest intention to drop out by the end of the year. Interestingly, their intention to drop out was even higher than what was reported by students who experienced higher and stable boredom during the whole year. This finding is consistent with previous works indicating an association between boredom and drop out (Tvedt et al., 2021), and adds for the first time the importance of grasping the evolution over time, rather than simply the level, in the experience of boredom. What is interesting is that, unlike what we observed as far as achievement and motivation were concerned, the two groups of students starting school with low levels of boredom also entered school with different intentions to drop out, higher for students who later on experienced a steep increase in boredom. Although our data do not allow us to provide a clear explanation for these findings, we advance two possible interpretations. First, the intention to drop out for students in class 2 might be interpreted by referring to the results of an Italian study (Berti et al., 2016) showing that in some cases students' choice of secondary school is influenced by parents or friends instead of being

autonomous[5]. The fact that these adolescents doubted from the very first month that the current school was the most suitable path for them indeed reveals some uncertainty with respect to the choice made. Second, this result could be explained by referring to the different types of boredom described by Goetz and colleagues (2014). More specifically, students belonging to the high increase class could have experienced a *searching* or *reactant* boredom, that is, forms of boredom characterised by moderate to high levels of arousal and negative valence and by the search for strategies to minimize such a negative feeling, including the possibility of moving away from the boredom-inducing situation.

Contrary to implicit expectations, the class experiencing a significant decrease in boredom reported at the end of the school a higher intention to drop out, akin to what was observed for the students in class 2 who finished the year with higher levels of boredom. Unfortunately, this study fails to identify the reasons for this counter-intuitive result, and further investigations are needed to explain why the decline in boredom was not associated with improvements in academic outcomes, as previous findings might have led us to expect. Nevertheless, it should be noted that the value of boredom for students in class 3 remained high even at the end of the school year, so that it would be legitimate to presume that positive trends might be visible over a longer period of time.

To sum up, the comparison of students with different boredom trajectories confirmed the association of this emotion with academic outcomes, as the group with the lowest levels of boredom throughout the year (class 1) consistently reported higher achievement and motivation and a lower intention to drop out as compared to those with higher levels of boredom (class 3 and 4). Moreover, the group with a steep increase in boredom (class 2) underlined the importance of considering not only the direction of change in boredom levels, but also the sharpness of change. Indeed, these students reported the strongest drop in achievement and motivation and reached the highest intentions to drop out by the end of the year as compared with all the other classes.

[5] In the Italian school system, students entering 9th grade are called to choose among different types of secondary school, from high school (classical or scientific studies), technical or vocational courses.

4.4. Limits and Suggestions for Future Research

This work has some limitations that need to be acknowledged when interpreting its findings and addressed in future research. First, the reading of fit indices when identifying the number of classes in latent class growth models is partially open to interpretation. However, the aim of this article was not to generalize the specific classes we discussed but rather to emphasize the importance of considering the co-existence of different trajectories, which we found to be accompanied by different academic outcomes. Second, while our analyses indicated substantial differences among the identified trajectories of boredom in terms of academic achievement, motivation and intention to drop out, they do not allow us to draw any conclusions about the causal or reciprocal links between these trajectories and the investigated outcomes. While previous longitudinal investigations have already provided evidence of the mutual relationship between student boredom and academic success (Pekrun et al., 2017; Putwain et al., 2018) and motivation (Sutter-Brandenberger et al., 2018), further studies are needed to examine other possible causal associations. As for academic achievement, we should note that reported grades were related to specific subjects and given by different teachers, and this raises the question of their comparativeness that warrants caution in the interpretation of results. Future research focused on the role played by different teachers, subjects and schools could provide further insights. Furthermore, an open question concerns the relation between boredom and the intention to drop out. The results related to the *Starting not bored and rearing up* class seem to suggest a positive connection between these variables (Bearden et al., 1989), while those of the class experiencing a significant decrease in boredom do not. Further investigations will be crucial to clarify causality and reciprocity between these dimensions, and to identify additional factors capable of explaining students' intentions to drop out and their evolution over time.

A further limitation concerns the short duration of the research and the specific socio-cultural context where it was conducted. As our study builds on three waves of data collected over a single school year on Italian 9th grade students, further studies are needed to confirm the identified

trajectories of boredom and their generalizability to broader populations of students, and to investigate whether these trajectories, as well as their related outcomes, persist or change over longer periods of time. An aspect that in our view deserves particular attention concerns those students whose feeling of boredom gradually decreased. Although in the present study this positive trend was not reflected in improvements of any of the considered academic outcomes, it is possible that investigations conducted over longer periods will find evidence of advancements for these adolescents.

A last critical point is that this research is obviously limited to the variables investigated. Although this study allowed us to distinguish four unique trajectories of students' boredom, no further information was gathered on additional relevant variables that might exert an influence, such as self-control (Mugon et al., 2020) or agency (Authors, 2020c). Beyond the various correlates of boredom, investigating what teachers can do to influence these trends may have relevant educational implications. Previous studies (Mainhard et al., 2018; Pekrun & Perry, 2014) have already highlighted that interpersonal processes in classroom dynamics play an important role for students' achievement emotions, but to our knowledge none of them has focused on boredom. This gap ought to be bridged, given the important role of this emotion for students' educational outcomes.

Conclusion

Notwithstanding the limitations described above, the results discussed in this paper are promising and contribute to a literature advance by showing that, beyond the average growth in boredom over time, the trends and even the direction of change differed in sub-groups of students. Not all adolescents become more bored in school as time goes by, or at least not all in the same way. Overall, our findings indicate that while a moderate increase and decrease in boredom are not necessarily associated with deteriorating and improving academic outcomes, respectively, a steep increase is instead accompanied by negative academic outcomes.

On scientific and practical levels, these results highlight not only the need to pay more attention to an emotion often overlooked in the school context (Tze et al., 2016), but to do so by focusing on the differences between individual paths. In a school that has increasingly emphasized the importance of personalizing education (Zhang, Basham, & Yang, 2020) by positioning students at the very heart of their educational life (Mameli et al., 2020), academics and school professionals should carefully consider these different trajectories, and find new ways and strategies to detect at-risk students and prevent their disengagement from school.

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Table 1. Descriptive statistics and intercorrelations for all variables.

	Variables	1	2	3	4	5	6	7	8	9
1	Boredom T1	-								
2	Boredom T2	.63**	-							
3	Boredom T3	.55**	.67**	-						
4	Ac. achievement T1	-.22**	-.17**	-.06	-					
5	Ac. achievement T3	-.18**	-.22**	-.17**	.47**	-				
6	Motivation T1	-.29**	-.27**	-.22**	.28**	.21**	-			
7	Motivation T3	-.26**	-.36**	-.34**	.19**	.19**	.69**	-		
8	Int. to dropout T1	.18**	.14**	.16**	-.07	-.15**	-.37**	-.26**	-	
9	Int. to dropout T3	.16**	.20**	.22**	-.13**	-.28**	-.26**	-.40**	.51**	-
	M	2.65	2.93	3.14	7.82	6.89	24.93	18.38	2.09	2.51
	SD	1.57	1.71	1.74	1.36	1.27	20.15	21.91	1.20	1.55
	Skewness	.99	.80	.63	-.52	-.14	-.54	-.48	1.50	1.23
	Kurtosis	.08	-.31	-.57	.17	.21	.01	.01	2.18	.71

Note. ** $p < .01$.

Table 2. Latent classes growth models fit indices for boredom.

Number of classes	N° students in each class	BIC	Entropy	VLMR-LRT
2	C1 135; C2 405	5641.44	.871	$p = .000$
3	C1 177; C2 297; C3 65	5533.25	.794	$p = .104$
4	C1 309; C2 87; C3 96; C4 47	5467.67	.835	$p = .082$
5	C1 256; C2 126; C3 29; C4 81; C5 47	5438.54	.810	$p = .168$

Table 3. Latent intercept and slope estimates

	Trajectory class			
Estimates	*Starting not bored and increasing*	*Starting not bored and rearing up*	*Starting bored and decreasing*	*Starting bored and maintaining*
Mean Intercept	1.73***	2.39***	4.28***	5.69***
Mean Slope	.15*	1.29***	-.41*	.20

Note. *$p < .05$. ** $p < .01$ *** $p < .001$.

Table 4. Paired comparisons between classes on academic achievement, motivation and intention to drop out

				Comparison with class 2			Comparison with class 3			Comparison with class 4		
	Academic outcomes	M	SD	χ^2	*p*	Cohen's D	χ^2	*p*	Cohen's D	χ^2	*p*	Cohen's D
	Academic achievement											
	T1											
1	Starting not bored and increasing	8.05	2.70	.08	.779	.04	6.89	.009	.31	15.33	.000	.30
2	Starting not bored and rearing up	7.93	3.96	-	-	-	1.28	.258	.20	1.57	.210	.20
3	Starting bored and decreasing	7.33	1.73				-	-	-	.005	.994	.01
4	Starting bored and maintaining	7.35	2.10							-	-	-
	T3											
1	Starting not bored and increasing	7.13	1.53	7.74	.005	.29	6.48	.011	.31	12.36	.000	.52
2	Starting not bored and rearing up	6.67	1.68	-	-	-	.007	.934	.01	1.63	.202	.21
3	Starting bored and decreasing	6.65	1.54				-	-	-	1.36	.243	.20
4	Starting bored and maintaining	6.34	1.51							-	-	-
	Motivation											
	T1											
1	Starting not bored and increasing	30.11	24.16	2.34	.126	.20	13.11	.000	.47	20.34	.000	.67
2	Starting not bored and rearing up	23.79	38.04	-	-	-	2.20	.138	.20	5.06	.024	.34
3	Starting bored and decreasing	16.66	32.17				-	-	-	.60	.438	.13
4	Starting bored and maintaining	12.59	27.79							-	-	-
	T3											
1	Starting not bored and increasing	26.55	28.27	23.58	.000	.59	24.79	.000	.58	32.51	.000	.79
2	Starting not bored and rearing up	7.99	33.95	-	-	-	.31	.576	.08	.54	.462	.10
3	Starting bored and decreasing	10.35	27.96				-	-	-	1.67	.197	.20
4	Starting bored and maintaining	4.85	26.67							-	-	-
	Intention to drop out											
	T1											
1	Starting not bored and increasing	1.64	1.36	18.94	.000	.66	12.99	.000	.43	11.77	.001	.56
2	Starting not bored and rearing up	2.89	2.29	-	-	-	3.28	.070	.26	1.11	.292	.19
3	Starting bored and decreasing	2.35	1.90				-	-	-	.265	.607	.09
4	Starting bored and maintaining	2.51	1.75							-	-	-
	T3											
1	Starting not bored and increasing	1.71	1.34	55.44	.000	1.00	37.67	.000	.71	10.32	.001	.61
2	Starting not bored and rearing up	3.69	2.46	-	-	-	1.18	.277	.23	7.33	.007	.43
3	Starting bored and decreasing	3.13	2.48				-	-	-	2.47	.116	.18
4	Starting bored and maintaining	2.73	1.96							-	-	-

Note. Academic achievement min = 1, max=10; Intention to drop out min = 1, max=7. The mean values for Motivation refer to the Relative Autonomy Index (see the Measures section) and correspond to the sum of weighted scores integrating information from the four motivational scales administered. In our sample, range for this variable was min = – 53, max = + 68.

Figure 1. Boredom trajectories