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Comparing College Students' Motivation Trajectories Before and During COVID-19: A Self-Determination Theory Approach

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College students' retrospective reports commonly indicate motivational declines associated with the COVID-19 pandemic. Using Self-Determination Theory, the present study provided a more nuanced examination of the pandemic's motivational effect by measuring actual change in six distinct types of motivation. We compared motivation trajectories from the first to the fourth year of college for two cohorts of students, with the fourth-year measurement taken prior to the pandemic in one cohort (n = 206) but during the pandemic in the other (n = 270). Compared to the pre-pandemic cohort, the COVID cohort showed sharper declines in identified and intrinsic motivation but no differences in controlled motivation or amotivation. Motivational declines associated with the COVID-19 pandemic appeared to be both real and specific to autonomous motives.

Keywords: college students, COVID-19, motivation, Self-Determination Theory, autonomous motives

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INTRODUCTION

The COVID-19 pandemic has disrupted higher education. It began with the large scale shift to online instruction in early 2020 and continued into subsequent academic years with modifications to nearly all aspects of functioning including instructional models, residential offerings, student enrollment, and institutional finances (June and Elias, 2021; Smalley, 2021). There have been similar disruptions to the subjective academic experience of college students. With increasing reports of anxiety, struggles to sustain attention, and difficulties staying motivated, academic engagement and performance have suffered (Cao et al., 2020; Dennon, 2021; Hicks et al., 2021).

COVID and Motivational Change

The present study focused on one of the most commonly reported effects of the COVID-19 pandemic on college students: a sense of declining motivation (Gonzalez-Ramirez et al., 2021; Hicks et al., 2021; Tasso et al., 2021). Indeed, 79% of United States college students in a large, nationally representative study indicated that staying motivated during online instruction was a problem (Means et al., 2020). Undergraduates at a research university similarly reported decreases in motivation and self-regulation alongside increases in stress following the shift to remote instruction (Usher et al., 2021). Even more strikingly, when these same undergraduates were asked about the most stressful aspect of the pandemic in an open-ended query, the most common response was difficulties with motivation and self-regulation – mentioned by approximately one-third of all students (Usher et al., 2021).

One limitation of these studies indicating motivational decline is that they rely on retrospective reports. Students were asked at a single point in time to consider how their current motivation

compared to their motivation prior to the pandemic. Although this provides valuable information, it is also possible that students' responses were colored by any number of memory biases (e.g., rosy retrospection, mood-congruent memory). Comparing motivational assessments collected before and after the start of the pandemic is needed to provide stronger evidence of true motivational change.

The literature on COVID-related motivational declines also has yet to consider longer-term assessments. Published studies to date have focused on the emergency shift to online instruction in early 2020. It is likely, however, that motivational challenges persisted into the 2020–2021 academic year and beyond in light of continued online instruction and COVID-related adaptations. One goal of the present study, therefore, was to test this hypothesis by comparing pre-pandemic motivational reports to those collected nearly 1 year into the pandemic, in December 2020.

A Self-Determination Theory Approach

A second goal of the present study was to provide a more fine-grained analysis of motivational change during the COVID-19 pandemic. Although reports of pandemic-related motivational declines have conceptualized motivation as a unitary construct, motivation can vary not only in quantity or amount but also in quality or type. Indeed, Self-Determination Theory (SDT) posits that motivation exists along a continuum of relative autonomy (Ryan and Deci, 2020). At the highest end of the continuum is *intrinsic motivation,* which represents fully authentic engagement driven by curiosity, interest, and enjoyment. Next comes *identified regulation*, which represents engagement driven by a sense of one's actions as important and meaningful, even if not wholly enjoyable. Next in the continuum is *introjected regulation*, which refers to engagement driven by a contingent sense of self-worth (e.g., gaining esteem; avoiding guilt or shame). Scholars have argued for the further subdivision of introjected regulation into a positive *approach* form (i.e., gaining esteem, seeking self-worth) and a negative *avoidance* form (i.e., avoiding guilt and shame, avoiding the loss of self-worth; Assor et al., 2009; Sheldon et al., 2017; Corpus et al., 2020) – an approach we adopt in the present study. Next comes *external regulation*, which refers to engagement driven by extrinsic rewards or constraints. Finally, at the least autonomous end of the continuum is *amotivation,* which refers to the absence of motivation altogether (Ryan and Deci, 2020).

Collectively, intrinsic motivation and identified regulation are referred to as *autonomous* motives, and are associated with positive outcomes in college students, including high academic achievement and retention (e.g., Taylor et al., 2014; Brunet et al., 2015; Meens et al., 2018). The two types of introjected regulation along with external regulation are referred to as *controlled* motives, and have more mixed outcomes, often showing no or weak predictive associations with achievement and retention (e.g., Vanthournout et al., 2012; Taylor et al., 2014; Brunet et al., 2015; Corpus et al., 2020). Amotivation, by contrast, is a clear negative predictor of both achievement and retention for college students (Vanthournout et al., 2012; Taylor et al., 2014; Corpus et al., 2020; Howard et al., 2021). The stakes of motivational change associated with the COVID-19 pandemic, then, differ dramatically depending on which type of motivation is impacted.

Moreover, one could imagine that the stresses of the pandemic might impact some types of motivation more than others. For example, autonomous motives require the support of basic psychological needs for relatedness, competence, and autonomy (Ryan and Deci, 2000). Support for relatedness presumably suffered during the pandemic as college students reported decreased connection to instructors and peers and increased loneliness and social isolation (Means et al., 2020; Gonzalez-Ramirez et al., 2021; Tasso et al., 2021). Support for competence was also likely diminished by the lack of appropriate structure in many remote learning models. Students reported unclear instructional parameters and difficulties tracking and managing time without the routine of in-person class meetings and access to designated study environments (Means et al., 2020; Hicks et al., 2021; Tasso et al., 2021; Usher et al., 2021). Although there is less evidence that support for autonomy was diminished, constraints on students' daily behaviors and constantly evolving safety protocols may have disrupted their sense of control.[1]

Taken together, diminished support for basic psychological needs would make it difficult for students to experience their courses as enjoyable and meaningful – i.e., to sustain autonomous motivation. Indeed, students reported their courses to be far less satisfying once instruction went online (Means et al., 2020), which is not surprising given that most students experienced emergency remote teaching, rather than thoughtful and well-executed online education (Hodges et al., 2020). Thus, we expected to see a decline in autonomous motives as a result of the pandemic. Turning to the other types of motivation, it seems likely that poor needs support in the context of emergency remote teaching could also lead to growth in amotivation, consistent with previous reports of pandemic-related motivational declines. It is less clear, however, how the pandemic would impact the more controlled types of motivation, such as introjected avoidance motives based in shame and guilt and external forms of regulation grounded in rewards and privileges. Perhaps some students drew heavily on these more controlled motives, especially if more autonomous motives were lacking.

The Present Study

In order to explore these possibilities, we considered the effects[2] of the COVID-19 pandemic on the full range of motivation types within the SDT continuum. We did so by comparing motivational change from the first to the fourth year of college among two consecutive and largely identical cohorts of college students who differed only in whether their fourth year of college began before or during the pandemic.

[1]One could also argue that autonomy supports were enhanced during the pandemic in that students could more flexibly manage their schedules, engaging hobbies and extracurricular interests. It is not clear, however, that such independence would necessarily be experienced as self-endorsed or autonomous (see Van Petegem et al., 2012).

[2]The term *effect* from this point forward is used to refer to a statistical effect. No implication of causality is intended as our correlational design precludes casual inferences.

We expected the two cohorts to be motivationally equivalent over the first two timepoints, which occurred in the first year of college prior to the pandemic. Importantly, we expected them to diverge by the fourth year when they had differential exposure to the pandemic. Assuming persistent motivational challenges related to COVID-19, we anticipated that the COVID cohort would evidence more maladaptive motivational trajectories from the first to fourth year of college than the pre-pandemic cohort. More specifically, we expected the COVID cohort to show declining trajectories of autonomous motives and increasing trajectories of amotivation relative to their pre-pandemic peers. There was little basis for formal hypotheses regarding the controlled motives.

METHOD

Participants and Procedure

Data were drawn from a larger longitudinal study focusing on motivational change among undergraduates in a liberal arts college context, which was approved by the Institutional Review Board at the first author's institution (see Corpus et al., 2020). Students at a small liberal arts college in the Pacific Northwest region of the United States enrolled in the study prior to the start of classes in their first year, and were invited to complete surveys several times throughout their undergraduate years. The present analysis focused on two consecutive cohorts of students matriculating in Fall 2016 (n = 206) and Fall 2017 (n = 270), who were 46.9% female, 48.2% male, 4.3% non-binary or other gender, 71.5% white, 22.7% Asian or Pacific Islander, 10.8% Hispanic/Latino/a, 3.3% Black, and 3.1% other races (groups were not mutually exclusive).

Students who completed at least one survey during the following three timepoints were included in the analytic sample: December of year 1 (T1; n = 327), May of year 1 (T2; n = 335), and December of year 4 (T3; n = 268). This third timepoint (T3) was collected pre-pandemic (December 2019) for Cohort 1 ("pre-pandemic cohort"), but nearly 1 year into the pandemic (December 2020) for Cohort 2 ("COVID cohort"). In contrast to the fully in-person model of instruction for the pre-pandemic cohort, learning modalities for the COVID cohort at T3 included courses offered online (34%), in hybrid formats (45%), and in person (21%). In addition, social distancing measures were implemented in physical classrooms, face coverings were mandated, and residential living was limited to one student per room. Students reported that these changes to the instructional offerings – coupled with the limited access to people and spaces on campus – made it difficult to stay academically engaged (Liu and Corpus, 2022).

Measures

Academic Motivation

Using the Academic Self-Regulation Scale (Vansteenkiste et al., 2009), students rated the importance of a variety of motives for their academic work on a 5-point scale (1 = *completely not important*, 5 = *very important*). Subscales reflected intrinsic motivation (e.g., "because I enjoy doing it"; 4 items; α = 0.86 −0.88), identified regulation (e.g., "because it is personally important to me"; 4 items; α = 0.79 −0.84), introjected approach regulation (e.g., "because I want others to think I'm smart"; 2 items; α = 0.80 −0.85), introjected avoidance regulation (e.g., "because I would feel ashamed if I didn't study"; 2 items; α = 0.80 −0.82), and external regulation (e.g., "because others oblige me to do so"; 4 items; α = 0.85 −0.86). In addition, the Academic Motivation Scale (Vallerand et al., 1992) was used to assess amotivation (e.g., "Honestly, I don't know; I really feel that I am wasting my time in school"; 4 items; α = 0.86 −0.89).

Academic Achievement

Academic achievement was indexed by GPA in the fall of year 2 and the fall of year 4, and was collected from institutional records for those students who consented to the release of such information.

Analytic Plan

Following confirmatory factor analyses, tests of longitudinal measurement invariance, and missing data analyses, latent change score models (McArdle, 2009) were used to examine changes in motivation between each measurement occasion. We used separate models for each construct, for a total of six models. Next, we added cohort (0 = Cohort 1/pre-pandemic, 1 = Cohort 2/during COVID-19 pandemic) as a predictor of initial levels and change scores to examine potential differences in motivation trajectories across the two cohorts who differentially experienced the pandemic. We also added year 2 and year 4 grades as predictors and outcomes of the relevant change scores in the model. **Figure 1** shows the path diagram describing the analytic models. Analyses were conducted using SPSS version 24 and Mplus version 8.4 (Muthén and Muthén, 1998–2017), and missing data was handled using full information maximum likelihood (FIML) estimation.

RESULTS

Confirmatory factor analyses indicated acceptable fit for the 6-factor model at each timepoint (RMSEA = 0.064 to 0.076, CFI = 0.935 to 0.952, TLI = 0.916 to 0.938; see **Table 1** for specific results). Tests of measurement invariance supported strong, strong partial, or strict invariance over time for each of the six constructs (see **Table 1**).

Of the total 476 students in the data (Cohort 1 = 206, Cohort 2 = 270), 55–71% completed each survey and 70–82% had GPA data available; **Supplementary Table 1** displays the participant flow by cohort and wave. Analyses comparing students with complete data to students with any missing data indicated that students in the two cohorts were equally likely to have missing data, χ^2 (1) = 0.052, p = 0.82, that students of color and white students were equally likely to have missing data, χ^2 (1) = 0.143, p = 0.71, and that levels of T1 variables did not differ across students with missing versus complete data, Wilks' λ (5, 465) = 0.987, p = 0.313. However, as is typically observed in survey research, men were more likely to have missing data than women, χ^2 (1) = 6.54, p = 0.011, and students with missing

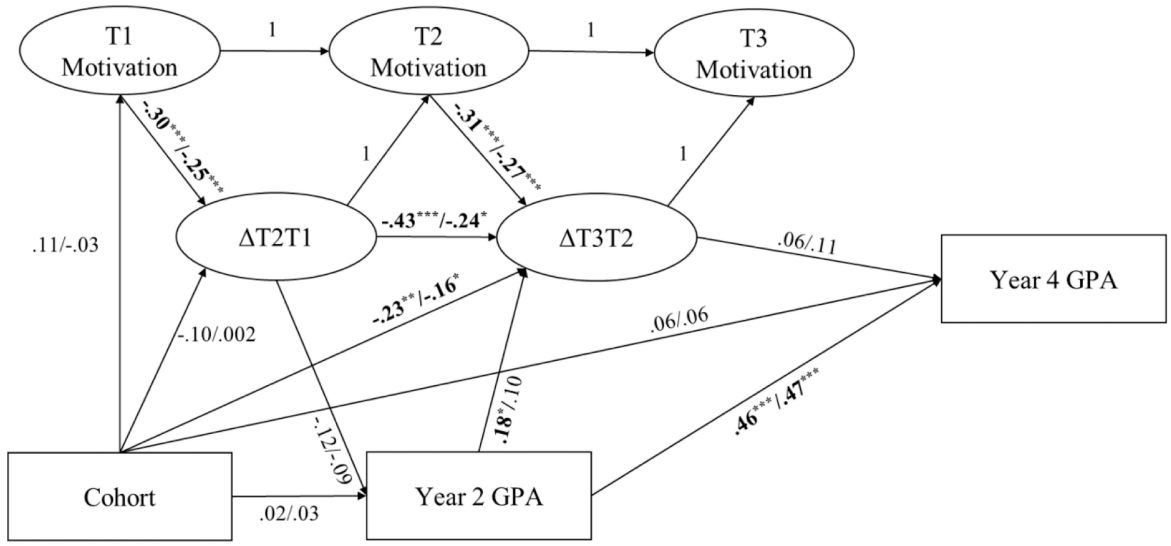

FIGURE 1 | Latent change model including initial levels of motivation, changes in motivation, and correlates of motivational changes. Models were conducted separately for each motivation type. Unstandardized coefficients are displayed for identified/intrinsic. ***p<0.001, **p<0.01, *p<0.05.

data had significantly lower grades during Year 2 than students with complete data, $t(378.46) = 3.188$, $p = 0.002$. Comparisons of demographic characteristics across the two cohorts indicated the two cohorts were similar in terms of proportions of women, χ^2 (1) = 1.597, $p = 0.206$, and people of color, χ^2 (1) = 1.773, $p = 0.183$.

Correlations and descriptive statistics (**Table 2**) revealed the expected patterns of correlations between variables. The autonomous motives (intrinsic, identified) were more positively and strongly correlated with one another than with the controlled motives (introjected, external), and the degree of agreement decreased as motive types became more distally related on the SDT continuum. There was also substantial agreement between repeated measures over time, with means for each construct showing patterns of stability rather than increases or declines.

Latent change score models for the two cohorts combined (**Table 1** and **Figure 1**) indicated patterns of stability for all constructs (see **Supplementary Figure 1**). Specifically, initial levels ranged from low ($M = 1.84$) for amotivation to high ($M = 4.14$) for identified regulation, and all change score estimates were not significantly different from zero for all six constructs (**Supplementary Figure 1**; ΔT2T1 = −0.28 to 0.01; ΔT3T2 = −0.10 to 0.12). Intrinsic and identified remained relatively high, both the approach and avoidance forms of introjection remained at moderate levels, with introjected avoidance motivation being slightly higher than introjected approach motivation, and external regulation and amotivation stayed relatively low.

When cohort and grades (year 2 and year 4) were added to the model as predictors and outcomes of initial levels of motivation and change scores (see **Figure 1**), cohort significantly predicted the ΔT3T2 estimates for identified regulation and intrinsic motivation ($b = -0.23$ to -0.16, $p < 0.05$), but not initial levels or any other change estimates. Thus, as expected, the two cohorts showed similar trajectories during their first year of college, but students who completed their fourth year of college during the pandemic reported steeper declines in intrinsic motivation and identified regulation between the end of their first year and their final year as compared to the pre-pandemic cohort (see **Figure 2**). The expected difference between cohorts in trajectories of amotivation, however, was not observed.

Changes in identified and intrinsic motivation did not predict year 4 grades when controlling for year 2 grades. Thus, although the COVID cohort reported steeper declines in some forms of motivation, the steeper declines in motivation did not appear to be detrimental to their achievement levels.[3]

DISCUSSION

The present study compared motivational change across two largely identical cohorts differing only in whether their fourth year of college began before or during the COVID-19 pandemic. Not surprisingly, there were no differences across cohorts in any of the motivation types from T1 to T2 when conditions for the two groups were quite similar. Although the cohorts appeared to show slightly different trajectories of identified regulation from T1 to T2 based on the model-implied trajectories in **Figure 2**, these differences were not statistically significant.

[3]For the sake of transparency, we note that we initially used year 4 spring GPA instead of year 4 fall GPA as the outcome variable because we aimed to have an outcome that was more distant from the final survey. These results were similar to the results presented here, except that cohort significantly predicted year 4 grades, with the COVID cohort having lower grades than the pre-pandemic cohort. However, year 4 spring GPA was actually measured after the beginning of the pandemic for both cohorts, and it seemed preferable to use an academic outcome that was collected pre-pandemic for the cohort 1 (the pre-pandemic cohort) and during the pandemic for cohort 2 (the COVID cohort). Thus, we opted to use year 4 fall GPA in order to enable a clearer interpretation of the results.

TABLE 1 | Fit Statistics for confirmatory factor analysis, measurement invariance, and latent change models.

Model	χ^2	df	RMSEA	CFI	Δ CFI	TLI	SRMR
Confirmatory factor analyses							
T1 6-factor	326.187	118	0.073	0.941	–	0.923	0.051
T2 6-factor	348.379	118	0.076	0.935	–	0.916	0.047
T3 6-factor	245.542	118	0.064	0.952	–	0.938	0.048
Measurement invariance over time: amotivation							
Configural	276.134	98	0.065	0.935		0.92	0.063
Weak	303.273	107	0.065	0.928	−0.007	0.919	0.072
Strong Partial*	**326.053**	**115**	**0.065**	**0.923**	**−0.005**	**0.919**	**0.072**
Strict	383.210	127	0.068	0.906	−0.017	0.911	0.078
Measurement invariance over time: external							
Configural	140.599	48	0.067	0.95		0.932	0.052
Weak	145.837	54	0.063	0.951	0.001	0.94	0.053
Strong	**150.408**	**60**	**0.059**	**0.951**	**0.000**	**0.947**	**0.054**
Strict	166.798	69	0.057	0.947	−0.004	0.95	0.052
Measurement invariance over time: introjected avoidance							
Configural	25.299	14	0.043	0.988		0.975	0.028
Weak	26.831	17	0.037	0.989	0.001	0.982	0.033
Strong	28.669	20	0.032	0.99	0.001	0.987	0.031
Strict	**35.116**	**26**	**0.028**	**0.99**	**0.000**	**0.989**	**0.043**
Measurement invariance over time: introjected approach							
Configural	47.175	14	0.074	0.967		0.933	0.031
Weak	48.465	17	0.065	0.968	0.001	0.948	0.034
Strong	**50.840**	**20**	**0.06**	**0.969**	**0.001**	**0.957**	**0.036**
Strict	66.509	26	0.06	0.959	−0.010	0.956	0.050
Measurement invariance over time: identified							
Configural	146.778	48	0.069	0.935		0.91	0.051
Weak	159.097	54	0.067	0.93	−0.005	0.915	0.065
Strong	**161.676**	**59**	**0.063**	**0.932**	**0.002**	**0.924**	**0.068**
Strict	195.061	68	0.066	0.916	−0.016	0.918	0.107
Measurement invariance over time: intrinsic							
Configural	282.499	98	0.066	0.93		0.915	0.060
Weak	303.731	107	0.065	0.926	−0.004	0.917	0.075
Strong	**315.822**	**116**	**0.063**	**0.925**	**−0.001**	**0.922**	**0.075**
Strict	341.128	128	0.062	0.919	−0.006	0.924	0.085
Latent change models							
Amotivation	236.669	62	0.081	0.926	–	0.921	0.062
External	101.314	32	0.071	0.957	–	0.951	0.053
Neg. Introjection	16.033	10	0.038	0.992	–	0.988	0.025
Positive Introjection	25.860	10	0.061	0.981	–	0.972	0.023
Identified	123.828	31	0.084	0.93	–	0.919	0.072
Intrinsic	188.477	63	0.068	0.945	–	0.943	0.067

**The intercept of one item at T2 was allowed to estimate freely. The selected models are presented in bold.*

Further, changes from T1 to T2 negatively predicted changes from T2 to T3, indicating that overall, declines early in college tended to buffer students from later declines.

Despite similarity between cohorts from T1 to T2, we found significant differences from T2 to T3 in identified regulation and intrinsic motivation, with the COVID cohort demonstrating motivational declines that were not observed in the pre-pandemic cohort. These findings suggest that the effects of the pandemic were motivationally specific, largely sapping enjoyment, curiosity-based engagement, and the sense that achievement is personally meaningful. Perhaps students in the COVID cohort struggled to sustain these more autonomous types of motivation because of diminished supports for basic psychological needs. Indeed, college students' experiences of relatedness, competence, and autonomy were almost certainly diminished due to the social isolation, transition to emergency remote instruction, and constraints placed on their daily behaviors during the pandemic (e.g., Gonzalez-Ramirez et al., 2021; Tasso et al., 2021; Usher et al., 2021).

There was no effect of COVID-19 on the more controlled motives or amotivation. This is interesting to consider in light of Rahiem (2021) finding that autonomous motives

TABLE 2 | Correlations and descriptive statistics for the study variables.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. T1Amo																				
2. T1Ext	**0.30**																			
3. T1AvJec	**0.13**	**0.41**																		
4. T1AppJec	0.07	**0.34**	**0.42**																	
5. T1Iden	**−0.51**	−0.03	**0.24**	**0.26**																
6. T1Intr	**−0.38**	−0.02	−0.01	**0.12**	**0.61**															
7. T2Amo	**0.60**	**0.22**	0.01	0.03	**−0.44**	**−0.33**														
8. T2Ext	0.07	**0.57**	**0.25**	**0.27**	0.01	−0.05	**0.19**													
9. T2AvJec	0.04	**0.28**	**0.54**	**0.31**	0.11	−0.09	**0.12**	**0.43**												
10. T2AppJec	0.01	**0.32**	**0.33**	**0.61**	**0.13**	0.01	−0.01	**0.44**	**0.50**											
11. T2Iden	**−0.40**	**−0.12**	0.08	0.09	**0.61**	**0.40**	**−0.48**	−0.002	**0.14**	**0.17**										
12. T2Intr	**−0.38**	**−0.19**	−0.11	−0.02	**0.43**	**0.65**	**−0.41**	−0.08	−0.06	0.08	**0.68**									
13.T3Amo	**0.26**	0.05	−0.01	0.04	**−0.32**	**−0.24**	**0.30**	−0.04	−0.05	0.01	**−0.36**	**−0.31**								
14. T3Ext	0.04	**0.37**	**0.20**	**0.26**	−0.08	−0.05	0.10	**0.45**	**0.26**	**0.31**	−0.08	**−0.14**	**0.29**							
15.T3AvJec	−0.03	**0.23**	**0.37**	**0.27**	0.03	0.04	−0.01	**0.34**	**0.45**	**0.34**	0.05	0.01	0.04	**0.42**						
16. T3AppJec	−0.05	**0.27**	**0.28**	**0.44**	0.11	0.08	−0.05	**0.37**	**0.31**	**0.54**	0.11	0.04	−0.02	**0.39**	**0.45**					
17. T3Iden	**−0.32**	−0.10	0.06	0.06	**0.52**	**0.41**	**−0.21**	0.01	−0.02	0.03	**0.45**	**0.40**	**−0.60**	**−0.19**	0.04	**0.13**				
18. T3Intr	**−0.25**	−0.11	−0.02	−0.05	**0.32**	**0.49**	**−0.23**	−0.04	−0.06	−0.03	**0.36**	**0.57**	**−0.56**	**−0.25**	−0.07	0.03	**0.63**			
19. Y2GPA	−0.10	−0.07	**0.15**	0.12	**0.14**	0.11	**−0.14**	−0.06	0.04	**0.12**	0.11	0.07	**−0.22**	0.03	0.13	**0.21**	**0.20**	0.12		
20. Y4GPA	**−0.13**	−0.05	0.06	**0.14**	**0.16**	0.04	**−0.18**	0.01	−0.02	**0.14**	0.15	0.07	**−0.14**	−0.06	0.12	**0.20**	**0.25**	**0.19**	**0.48**	
N	327	327	325	320	327	327	335	335	335	331	335	335	267	267	266	267	268	267	387	340
M	1.69	2.31	3.29	2.71	4.05	3.51	1.62	2.23	3.19	2.70	4.06	3.54	1.75	2.20	3.04	2.63	4.03	3.55	3.05	3.43
SD	0.87	1.02	1.13	1.11	0.91	0.92	0.79	0.98	1.07	1.06	0.91	0.95	0.86	1.07	1.16	1.12	0.89	1.01	0.74	0.59

T1 = Time 1, Amo = Amotivation, Ext = External, AvJec = Introjected Avoidance, AppJec = Introjected Approach, Iden = Identified, Intr = Intrinsic. Bolded are all $p < 0.05$.

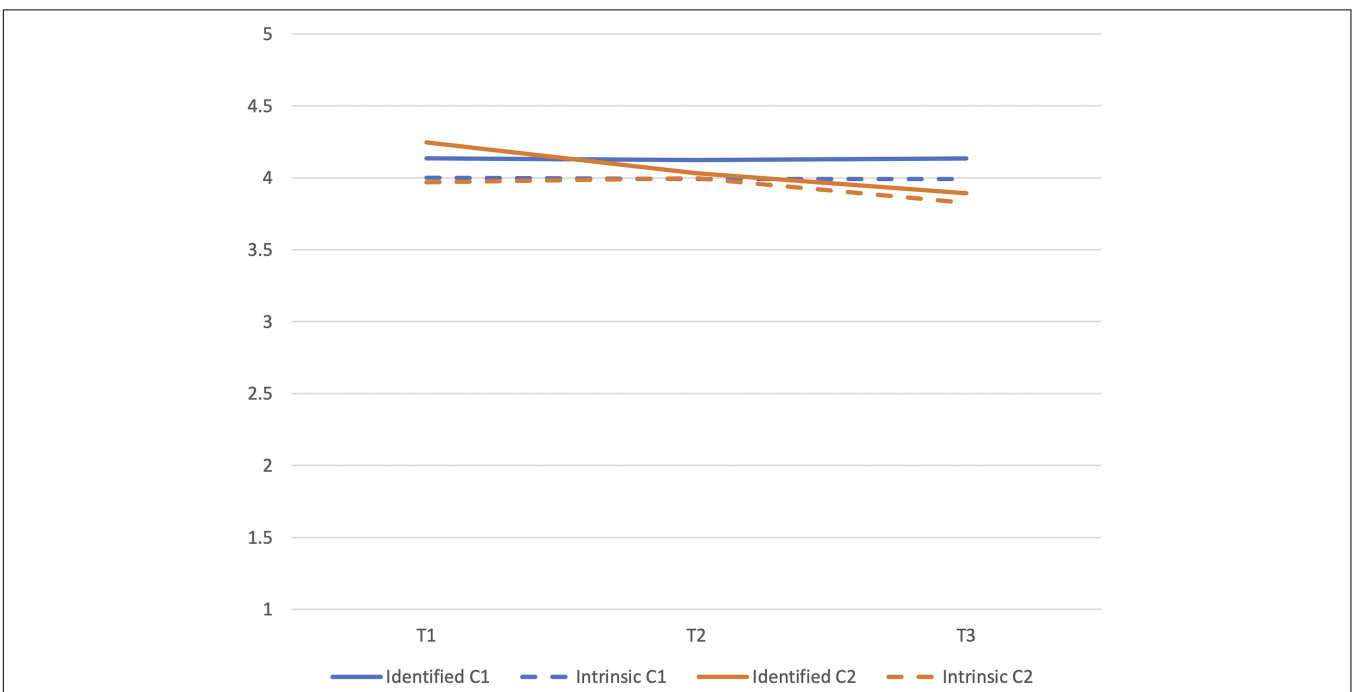

FIGURE 2 | Trajectories of identified and intrinsic motivation by cohort. T3 was collected pre-pandemic (December 2019) for Cohort 1 (C1), but nearly 1 year into the pandemic (December 2019) for Cohort 2 (C2).

were more prominent than controlled motives among students from Indonesia who remained motivated in spite of pandemic limitations. It is surprising, however, that there was no growth in amotivation among the COVID cohort given the general motivational difficulties that have been reported widely in the literature (e.g., Hicks et al., 2021; Tasso et al., 2021; Usher et al., 2021). Previous research has relied upon students' subjective reports of declining "motivation," framed as a global, unitary construct. By distinguishing among the different subtypes of motivation, the present study suggests that what appears to be

an overall decline in motivation (and rise in amotivation) is actually specific to autonomous types of motivation. Students in the COVID cohort, therefore, appear not to have decreased in their overall investment in their schooling, but rather in the sense that the work is enjoyable and meaningful.

Although autonomous motivation typically predicts high academic achievement (Taylor et al., 2014; Brunet et al., 2015), motivational change did not predict Year 4 GPA in the present study when controlling for Year 2 GPA, nor were there achievement differences between the two cohorts. One might have expected lower GPAs for the COVID cohort given the reported difficulties with motivation, self-regulation, stress management, and attentional control in the broader literature (Hicks et al., 2021; Usher et al., 2021). Perhaps the relatively low and stable levels of amotivation for both cohorts was enough to maintain achievement, especially given that amotivation is typically a strong negative predictor of GPA (Taylor et al., 2014; Corpus et al., 2020; Howard et al., 2021). At the same time, it is difficult to compare GPAs for the two cohorts because standards for grading and assessment shifted so dramatically during the pandemic (Hartocollis, 2020). Future research would benefit from comparisons using less subjective indicators of learning and achievement, such as scores on particular instruments assessing conceptual understanding. It would also be fruitful to include other outcomes (e.g., well-being, persistence) that may be more responsive to changes in autonomous motives (Howard et al., 2021). At the same time, it is important to remember that motivation itself is a meaningful outcome.

The present study was also limited by the lack of motivational assessments during the second and third years of college. We cannot rule out the possibility that differences between the two cohorts from T2 to T3 were driven not by COVID-19 but rather by some other intervening event between the first and fourth years of college. Documenting comparable motivational responses throughout the fall of the first, second, and third years of college would help to show that diverging pathways in the fourth year aligned more precisely with the onset of the COVID-19 pandemic. Even then, it is likely that students' declining motivational trajectories resulted not only from the pandemic but also from unprecedented sociocultural and regional stressors (e.g., racial protests, epic wildfires) occurring simultaneously. The correlational nature of the present study simply does not allow for causal inferences.

It is also important to acknowledge the results of our missing data analyses, which indicated that our data may underrepresent the experiences of men and lower-achieving students in particular. Our use of FIML estimation reflects best practices for minimizing bias in model estimates due to missing data. However, future research may perhaps benefit from a focus in particular on understanding the motivational experiences of men and lower-achieving students using more personalized incentives or non-survey methods.

Despite these limitations, the present study shows that previously reported motivational costs of COVID-19 cannot be explained by simple memory biases that come from retrospective reports. Instead, it appears that the motivational decline associated with the COVID-19 pandemic is real, can be observed nearly 1 year into the pandemic, and is specific to autonomous motives. Although these changes were relatively small, prior research indicates that even small changes in autonomous regulation types can have important implications for outcomes (Howard et al., 2021; Pap et al., 2021).

Remediation efforts, therefore, might focus on supporting the basic psychological needs that help to build such motives. Students' sense of belonging can be enhanced when peers work collaboratively on tasks, instructors and students learn of shared preferences, and content is represented as consistent with valued goals (Walton and Brady, 2017). Such interventions to promote belonging increase students' intrinsic motivation, sense of meaning, and academic achievement (Walton and Brady, 2017). Likewise, instructors can be effectively taught to use autonomy-supportive practices, such as providing students with meaningful choices, using informational language, and acknowledging negative emotions (Su and Reeve, 2011). These practices, in turn, enhance students' intrinsic motivation, engagement, and academic achievement, while reducing their levels of amotivation (Patall et al., 2010; Cheon and Reeve, 2015). With broader implementation, such practices may forestall the decline in autonomous motives associated with the COVID-19 pandemic.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Reed College Institutional Review Board. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

JC, KR, and ZL developed the study concept. JC and ZL collected the data. KR performed the data analysis. JC and KR wrote and revised the manuscript. All authors contributed to the article and approved the submitted version.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/feduc.2022.848643/full#supplementary-material

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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