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Reversing the paradigm: Motivational fluidity predicts lower student engagement

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There is a need to enhance understanding of the dynamic process of student engagement in Higher Education (Shernoff, 2013) using methods that embrace intra- and inter-individual change and processes and a theoretical framework that offers a dynamic, intra- and inter-individual approach to interpret motivation, affect, and behavior. This study used reversal theory (Apter, 2018) to investigate university students' engagement and affect in relation to metamotivational state reversals during three large-group 50-minute lectures. 172 participants reported their affect at the start of the lecture and affect, engagement, and metamotivational state at three randomly chosen timepoints throughout each of three lectures early, mid, and late semester. Where differences occurred, cognitive, behavioral, and emotional engagement were higher and affect more positive/less negative in non-reversers than reversers, with one exception: agentic engagement was higher in reversers than non-reversers during the final week ($p < .05$). Across all three weeks the majority of students reported no reversals (72.4-78.7%) and were mostly in the telic, conformist and autic-sympathy or autic-mastery states. Thus psychodiversity, based on our context-specific operationalisation, was observed but not widely demonstrated, and overall, did not appear to be beneficial. Curiously, the only benefit was in relation to an interactive form of engagement. Our findings suggest that most students matched their metamotivational states to the demands of the environment (see Apter, 2018). Further inquiry is needed into psychodiversity and into a key aspect of reversal theory that needs attention: understanding how people control, or can be taught to control, their reversals (Apter, 2013).

Keywords: psychodiversity, metamotivational, affect, lecture, education

Introduction

Understanding students' experience and engagement is at the forefront of the Higher Education agenda across the globe. Researchers are examining student engagement in the United States (e.g., Linnenbrink-Garcia et al., 2011), in mainland Europe (Ketonen et al., 2018), in South America (e.g., Orial-Granado et al., 2017), in East Asia (e.g., Reeve & Lee, 2014), as well as in the UK (e.g., Denovan et al., 2020). There are multiple reasons for this widespread interest in student engagement, as optimising the learning experience for university students requires cognitive, emotional, and behavioral engagement (Fredericks et al., 2004) and engagement is related to various positive outcomes for students. Behavioral engagement refers to the individual's attention, effort, and persistence related to the task. Emotional engagement involves experiencing positive emotions such as interest, rather than negative emotions such as anxiety. Cognitive engagement refers to the individual's use of deep learning strategies, such as elaboration. Agentic engagement refers to the individual's constructive input into their teaching, such as by asking questions (see Reeve & Lee, 2014).

Review evidence identified associations with, inter alia, self-esteem, persistence, critical thinking, improved grades, and student satisfaction. In high school students, changes in engagement predicted changes in psychological need satisfaction, motivation, self-efficacy, and mastery goals (Reeve & Lee, 2014; Trowler, 2010). In university students, self-efficacy predicted academic engagement, which in turn pre-

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dicted academic performance. Behavioral engagement was related to intrinsic motivation, positive emotion, students' perceived learning, and grades (Orial-Granado et al., 2017; Shernoff, 2013). Given these important correlates of student engagement, work has progressed to understand and influence its determinants.

These subsequent investigations recognise that engagement is a dynamic process that calls for repeated observations of individuals over time (Shernoff, 2013). Thus, unlike earlier research, more recent studies of student engagement have made use of approaches such as Experience Sampling Methods (ESM). Sampling from university students four times a day over a 4-week period, Ketonen et al. (2018) identified that students who set autonomous educational goals reported more positive emotions, whereas setting controlled goals was associated with negative emotional experiences. Interestingly though, higher levels of both autonomous and controlled goal motivation were associated with increased determination. The authors offered these findings as indicative of two classes of positive activating emotions; namely, those that relate to more behavioral forms of engagement (e.g., determination) and those that relate to more emotional aspects of engagement (e.g., enthusiasm).

Observing university students twice in each of three teaching sessions spread across a semester, Shernoff et al. (2017) found that positive classroom practices, such as sitting at the front of the class, positively predicted within-student variation in engagement and attention and that engagement subsequently predicted perceived learning and, based on between-student effects, academic grades. Finally, adopting a longitudinal approach and collecting data three months apart, at both timepoints, university students' future time perspective predicted engagement which in turn predicted positive affect (Denovan et al., 2019). In addition, positive affect at time one predicted positive affect at time two, and engagement and future time perspective at time two were influenced by positive affect.

Given the evidence to date, calls for further exploration of the dynamic relationship between affect and engagement in both traditional and small group learning environments have been made (Linnenbrink-Garcia et al., 2011). Enhancing understanding of student engagement as a dynamic process (cf. Shernoff, 2013) requires not only methods that embrace intra- and inter-individual change and processes, but also a theoretical framework that offers a dynamic, intra- and inter-individual approach to interpret motivation, emotion, and behavior.

Reversal theory (Apter, 2001) presents a particularly compelling framework for exploring dynamic psychological, emotional, and behavioral processes as its central tenet is that frequent change in an individual's psychological state, their metamotivational state, is to be expected and in fact, can be beneficial for the individual's psychological health. There is a wide evidence base of over 400 peer-reviewed papers alone, across different domains of human experience (e.g., health, sport, business, gambling behavior, and addiction; see Hudson et al., 2016), that supports these fundamental assumptions of reversal theory. Moreover, the applicability of reversal theory within an educational context has been highlighted by Atleo in 1988, postulating that reversal theory provides educational inquiry with a more sophisticated conceptual model than the dichotomous models most widely used at that time (e.g., deep versus surface learning approaches). She suggested that with its focus on phenomenology, reversal theory can be used by the educator and the adult learner to understand the learner's shifting field of experience and to manage their motivational environment to create an optimal phenomenological frame and facilitate positive outcomes for the learner. Recognising this, there has been some application of reversal theory to explore situational student engagement, emotion, and motivation in different educational settings, albeit much less so than in other domains of experience, with only a handful of published studies to-date (i.e., Cramer & Lafreniere, 2015; Grewal & Lafreniere, 2003; Lewis, 2013).

Although conducted in a school setting, Lewis' (2013) case study noted that, as might be expected, metamotivational state reversals were associated with observed changes in behavior, leading him to propose that the alloic mastery state combination (focused on helping others to achieve) might help to enhance the individual's engagement in educational contexts.

With an emphasis on phenomenology and the individual's interpretation of their world, the individual's subjective experience and meaning are placed at the heart of reversal theory. The way in which individuals interpret their current experience, their desired outcomes, resultant behaviors, and associated emotions is dependent on their current metamotivational state.

Individuals will reverse between the dichotomous states within each of four pairs (telic-paratelic; mastery-sympathy; autic-alloic; negativistic-conformist; please see Desselles et al., 2014 and Mullet et al., 2014 for descriptions of the states), in response to frustration at the needs and motives of the current state not being met, natural satiation of time spent in one state meaning it is no longer motivating, or, a contingent event that is internal or external to the individual.

Apter (1989; 2001) has also proposed that the motivational richness offered by reversing between and experiencing different metamotivational states on a daily, hourly or even minute by minute basis, referred to as psychodiversity, can contribute to positive psychological well-being. Evidence to support this proposal is currently limited but has been offered by Thomas et al. (2018) from two laboratory studies where university students' need satisfaction was manipulated during their completion of verbal and numerical cognitive tasks. In contrast, more recent exploratory

work revealed inconsistent relationships between psychodiversity and well-being (see McDermott et al., 2021). In one study (Thorpe-Jones & McDermott, 2019) they discuss, psychodiversity was related to poorer well-being, except for the negativistic-conformist state pair where it was associated with enhanced well-being. In a second (Alfonso & McDermott, 2020), psychodiversity in the autic-alloic state pair was related to breadth of coping, but in the mastery-sympathy pair, to resilience. Further investigation of this key reversal theory proposal is therefore required as understanding how motivational richness can lead to benefits for the individual could have important implications for enhancing learning and teaching environments.

When undergraduate students carried out a critical thinking task in a laboratory experiment that manipulated feedback to induce high or low perceived control over task performance, in comparison with the paratelic state, the telic state was associated with a less positive and more negative mood state and with more emotion-focused and avoidance coping (Grewal & Lafreniere, 2003). Somewhat contradicting these findings, based on multiple measures in a single class, the telic state was associated with undergraduate students' lecture engagement, both of which decreased as the 75-minute lecture progressed (Cramer & Lafreniere, 2015). Subsequently, to address the observed decrease in telic state experience, Cramer and Lafreniere (2015) used a mid-lecture activity to induce and saturate students' experiences of the paratelic state and encourage a return to the telic state. Although engagement and telic metamotivational state still decreased throughout the lecture, they did increase immediately following the paratelic activity. Thus, it appears that metamotivational state, and subsequently student engagement, can be manipulated, at least over the short term.

In sum, it is important that we further understanding of university students' engagement and associated outcomes. Reversal theory offers an ideal framework as its dynamic phenomenological core enables the longitudinal, intra- and inter-individual analysis that is needed in this exploration. Although initial support has been offered for its use in this context, research needs to include all four pairs of metamotivational states and a wider range of relevant outcomes (e.g., affect) using a longitudinal design. In this study, we addressed the first of these needs.

Thus, this study aimed to: (i) examine if engagement and affect differed in those students who experienced reversals during a lecture session and those who did not and, (ii) explore metamotivational state profiles and reversals experienced by students within large lecture teaching sessions.

We address a fundamental, but not well researched, proposition of reversal theory, that motivational richness, or psychodiversity, is associated with positive outcomes for the individual. We hypothesised that psychodiversity (operationalised as the experience of reversals indicating varied state experiences) will be associated with higher levels of engagement and more positive affect than if no reversals are experienced.

Methods

Participants

Participants were first year undergraduate students pursuing one of two Science degrees and completing a compulsory module in their first semester at a UK university. The study sample was therefore drawn from an intact cohort and comprised of volunteers. The overall sample of 172 represented 88.6% of the total class size (N = 194).

Procedures

The College Research Ethics Committee granted ethical approval for the study and students provided written informed consent to participate at the start of the first data collection session. Data were collected in three whole class lectures, delivered on the same module by the same lecturer, spaced three weeks apart and located at the start, middle, and end of the 11-week semester (weeks 3, 6, and 10). The lecturer (who is a co-author) was present but was unable to see which students completed and which students did not complete the questionnaires. Within each lecture, students completed questionnaires (described below) prior to the start of the lecture (T1) and at three subsequent timepoints in each third of the following 50-minute lecture (T2, T3, and T4). Each data completion took between 5 and 10 minutes. The exact timings of data collection at each timepoint were randomly selected using random number generation software. At T1, students only reported their affect (as our original intention was to use initial affect as a covariate in subsequent analyses but the intended modeling analyses were not possible with our final dataset). At each of the subsequent timepoints they reported their affect, engagement, metamotivational states, and self-efficacy (self-efficacy scores are not reported here as self-efficacy is not a central construct of reversal theory, but these scores can be obtained from the first author on request). The order in which students completed measures was counterbalanced across timepoints within sessions.

Measures

Metamotivational states were measured using Desselles et al.'s (2014) Reversal Theory State Measure Bundled Version (RTSM-B). This measure includes three items. The first two offer a dichotomous choice between bundles of statements describing the telic-paratelic and negativistic-conformist pairs. Each bundle includes three statements relating to each state and participants were asked to select the bundle (and therefore state) that best represents their motivation immediately prior to answering the current question set

(T2, 3 or 4). The third item includes four bundles, each including three items, and representing the autic mastery, autic sympathy, alloic mastery, and alloic sympathy state pairings.

Respondents are asked to select one of these four bundles. For illustration, statements used in the telic state bundle are as follows: "Accomplish something for the future; Do something serious; Do something crucial". Three versions of this metamotivational state measure have been developed (see Desselles et al., 2014) and, based on seven a priori criteria determined to assess the measures' use, the researchers determined that the bundled version is the strongest and most useful measure. It is well-grounded conceptually, sensitive to intra- and inter-individual differences, suitable across research settings and adult populations, and includes all four pairs of states (supported by factor analysis results).

Student engagement was measured using the Behavioral Engagement and Emotional Engagement scales from Skinner et al.'s (2009) Engagement vs. Disaffection with Learning measure, Wolters' (2004) Metacognitive Strategies questionnaire, and the Agentic Engagement Scale (Reeve, 2013). In total, the number of items used was 12, equally distributed across four subscales measuring behavioral, cognitive, emotional and agentic engagement. In their use of these scales across three time points, Reeve and Lee (2014) reported Cronbach's alphas ranging from .65 to .88, with only one below .70. Example items from each engagement scale include: "I pay attention in class" (behavioral); "I enjoy learning new things in this class" (emotional); "Before starting an assignment for this class, I try to figure out the best way to do it" (cognitive), and "During this class I ask questions to help me learn" (agentic).

Affect was measured using 14 items developed by Linnenbrink-Garcia et al. (2011) based on Watson and Tellegen's (1988) and Thayer's (1986) measures of affect. This includes four subscales: activated positive (4 items), activated negative (4 items), deactivated positive (3 items), and deactivated negative (3 items). Subscale example items and Cronbach's alphas reported by Linnenbrink-Garcia et al. are as follows: activated positive (enthusiastic, $\alpha = .77$); activated negative (worried, $\alpha = .72$); deactivated positive (relaxed, $\alpha = .75$); and deactivated negative (worn out, $\alpha = .86$). Participants are asked to use a 5-point Likert type scale, anchored by *1 = Not at all true* to *5 = Very true* to indicate the extent to which each item describes how they are currently feeling.

Data Analysis

To explore participants' metamotivational state profiles we used descriptive statistics for each week of testing including percentages of reports of each metamotivational state, frequencies of reversals and states reversed between, and the numbers of students in relation to reversal frequency. Reversals were identified by reviewing states reported at adjacent timepoints and, if these differed, this was classed as a reversal. We noted the number, percentage, and nature (states reversed between) of each reversal identified. We excluded instances where data were missing. If any reversals were evident between timepoints, the participant was classified as a reverser.

To compare reversers and non-reversers we conducted three sets of analyses, one for each week of data collection, with mean scores of measures of engagement and affect for each week, as the dependent variables. For variables that were normally distributed, independent t-tests were conducted; for those that were not normally distributed, Mann-Whitney U tests were used to compare reversers and non-reversers on these variables. Although we conducted multiple difference tests, as we specified a priori hypotheses we did not apply Bonferroni's correction factor; this therefore was retained at .05 (Armstrong, 2014). Due to dependency of the data across weeks, we analysed data in each week separately.

Results

Engagement and reversals

During week one, non-reversers reported significantly higher cognitive and behavioral engagement than reversers (respectively, $t(132) = -2.51, p = .007$ and $t(132) = -1.79, p = .04$). For cognitive engagement the mean for reversers was 11.37 ± 2.56 and for non-reversers, 12.73 ± 2.89. For behavioral engagement the mean for reversers was 14.50 ± 3.22 and for non-reversers, 15.57 ± 3.06. During week two, there were no significant differences between reversers and non-reversers on any of the engagement variables ($p > .05$). At week three, non-reversers reported significantly greater behavioral and emotional engagement than reversers (respectively, $t(80) = -3.78, p < .001$ and $t(80) = -2.75, p = .004$). For behavioral engagement the mean for reversers was 11.55 ± 2.50 and for non-reversers, 14.06 ± 2.61. For emotional engagement the mean for reversers was 11.73 ± 2.38 and for non-reversers, 13.81 ± 3.01. In contrast, reversers reported significantly greater agentic engagement than non-reversers: $U = 408$, $p = .02$; the mean rank for reversers was 52.1 and for non-reversers, 38.08.

Affect and reversals

During week one, non-reversers reported higher activated positive affect than reversers: $U = 2199.5$, $p = .04$; the mean rank for non-reversers was 71.68 and for reversers, 56.55. At week two there were no significant differences in any of the affect measures between reversers and non-reversers ($p > .05$). During week three reversers reported significantly higher activated negative, and significantly lower activated positive, affect than non-reversers, respectively: $U =$

Table 1

Frequency and percentage of students who reported each state/state combination at each time point in three different teaching sessions (weeks 1-3); percentages refer to percentages of reports within each state pair/transactional state pairs.

	Telic		Paratelic	Conformist		Negativistic	Autic Mastery	Alloic Mastery		Autic Sympathy	Alloic Sympathy
Week 1											
Time 2											
Frequency	96		27	115		11	28	5		28	12
Percentage	78.0		22.0	91.3		8.7	38.4	6.8		38.4	16.4
n		123			126				73		
Time 3											
Frequency	103		29	115		12	24	8		29	13
Percentage	78.0		22.0	90.6		9.4	32.4	10.8		39.2	17.6
n		132			127				74		
Time 4											
Frequency	101		28	115		12	30	4		32	9
Percentage	78.3		21.7	90.6		9.4	40.0	5.3		42.7	12.0
n		129			127				75		
Week 2											
Time 2											
Frequency	90		26	108		8	26	6		22	13
Percentage	77.6		22.4	83.7		6.2	38.8	9.0		32.8	19.4
n		116			129				67		
Time 3											
Frequency	89		28	106		11	26	10		22	13
Percentage	76.1		23.9	90.6		9.4	36.6	14.1		31.0	18.3
n		117			117				71		
Time 4											
Frequency	90		29	109		10	28	8		24	13
Percentage	75.6		24.4	91.6		8.4	38.4	11.0		32.9	17.8
n		119			119				73		
Week 3											
Time 2											
Frequency	54		27	76		4	16	4		17	12
Percentage	66.7		33.3	95.0		5.0	32.7	8.2		34.7	24.5
n		81			80				49		
Time 3											
Frequency	56		26	74		6	15	2		20	11
Percentage	68.3		31.7	92.5		7.5	31.3	4.2		41.7	22.9
n		82			80				48		
Time 4											
Frequency	57		24	70		9	14	3		18	12
Percentage	70.4		29.6	88.6		11.4	29.8	6.4		38.3	25.5
n		81			79				47		

442, $p = .05$, and $U = 846.5$, $p = .01$. For activated negative affect the mean rank for reversers was 50.4 and for non-reversers, 38.63. For activated positive affect, the mean rank for reversers was 30.18 and for non-reversers, 45.15.

Metamotivational state experiences

We observed relatively consistent percentages of students reporting each of the metamotivational states across the three weeks of testing (see Table 1). The only exception was the telic and paratelic state pair where a slight increase in the percentage of reported paratelic states was identified during

Table 2
Frequency of reversals (and relative percentage for each week in brackets) reported for each state pair/the transactional state combinations, including all possible reversal directions.

State Pair	Week 1	Week 2	Week 3
Telic-Paratelic	26 (43.3%)	20 (35.7%)	12 (36.4%)
Negativistic-Conformist	9 (15.0%)	10 (17.9%)	7 (21.2%)
Transactional States	25 (41.7%)	16 (28.6%)	14 (42.4%)

week three. On the whole, the students reported experiencing the telic, autic, and conformist states (but with no discernible difference between autic mastery and autic sympathy).

Reversal experiences

During week one, 37 students reported at least one reversal and 97 reported no reversals, representing 27.6% and 72.4% of the total number of respondents during week one (see Table 2). During week two, 26 students reported at least 1 reversal and 97 reported no reversals, representing 21.3% and 78.7% of the total number of respondents during week two. During week three, 20 students reported at least 1 reversal and 62 reported no reversals, representing 24.4% and 75.6% of the total number of respondents during week three. The majority of students reversed either once or twice (week one: 18 students reversed once, 16 twice, 2 three times, and 1 four times; week two: 11 once, 11 twice, 3 three times, and 1 four times; week three: 13 once, 5 twice, 2 three times, and 1 four times).

Discussion

This study explored if engagement and affect differed in those students who experienced reversals during a lecture session and those who did not. By exploring this question, we provide some insight into the understudied concept of psychodiversity and its projected benefits for individuals. The study also explored metamotivational state profiles and reversals experienced by students within large lecture teaching sessions delivered over the course of a university semester of teaching. Three main findings emerged: first, that psychodiversity (conceptualised here as more frequent reversals) was *negatively* related to engagement and affect; this unexpected finding raises important questions for our understanding of how motivational states might impact acute consequences in educational settings. Second, surprisingly few individuals reversed during the periods monitored, suggesting a greater stability in metamotivational states for some individuals than was expected. Third, unsurprisingly, telic (goal-directed) and conformist states dominated students' motivational presentations.

Engagement, affect, and reversals

Our hypothesis that reversers would report more positive affective experiences and greater engagement than non-reversers was not supported; indeed, data demonstrated that both engagement and affect were higher in those who did not reverse. The only instance when engagement was higher in reversers than non-reversers was agentic engagement in week three. Given that non-reversing students were mostly in the telic, autic, and conformist states, students who reversed were relatively more likely to experience the paratelic, alloic, and negativistic states. This state combination appears to be more aligned with agentic engagement, which involves interacting and asking questions. Possibly this state combination also reflected their dominant states, meaning they were more comfortable, leading to confidence to interact within the class. This conjecture is of course speculative and so we recommend further investigation into this.

Although all forms of engagement appeared to be relevant, only activated affect appeared to be relevant here. From a lecturer's perspective, the fact that deactivated affect was not relevant is encouraging. To purposely delimit the scope of our study, we did not explore relationships between metamotivational states, affect, and engagement but the finding that students who did not experience reversals reported greater engagement and more positive affect perhaps lends indirect support for associations between the telic state and positive emotions that was reported by Grewal and Lafreniere (2003). These non-reversing students were most likely to have been experiencing the telic state as it was more frequently reported than the paratelic state. Future work could explore the links between metamotivational states, engagement, and affect more directly and include measures of learning to assess the functional value of the metamotivational state profiles and reversals reported here.

The question raised by Apter (2013) of whether psychodiversity is a benefit is an important one but is still unanswered. Psychodiversity, at least using our context-specific operationalisation of this concept, was observed, but did not appear to be widely demonstrated in our study and, at least as far as our outcome variables are concerned, did not appear to be of benefit. This finding contradicts the small existing literature base examining psychodiversity (i.e., Thomas et al. (2018); Alfonso & McDermott (2020) and work on the negativistic-conformist state pair by Thorpe-Jones & McDermott, 2019). It does however support evidence presented in this latter study in relation to the remaining state pairs. It could be that psychodiversity is not of benefit, or that it is a multidimensional, not a unidimensional, construct, as McDermott et al. (2021) propose. As we approached psychodiversity unidimensionally, this could explain the lack of a relationship between engagement and psychodiversity. Alternately, Apter's (2013) concept of matching might explain our results. Students who did not experience reversals, based

on the metamotivational state profiles we obtained, remained largely in the telic, conformist, and autic states, reflecting the motivational intelligence (Apter, 2013) needed to optimise the lecture experience and personal outcomes. These are the states required and facilitated by the lecture environment, therefore as these students were able to match their metamotivational state profiles to the environmental requirements, they experienced more positive affect and engagement. It would be interesting to investigate how these students maintained this matched state to determine if any strategies could be identified to help other students to control their reversals to ensure their metamotivational states better matched the environmental demands. Not only would this offer practical implications for helping students to engage but would also advance our understanding of a further area of reversal theory that needs attention: understanding how people control, or can be taught to control, their reversals (Apter, 2013).

Metamotivational state profiles

The most frequently reported metamotivational states were telic, conformist, autic mastery, and autic sympathy, which is understandable given these lectures were part of a long-term, achievement-focused educational experience that has important consequences for the individual and involves both implicit and explicit behavioral norms that participants are expected to follow. Although no previous studies have examined all four metamotivational state pairs within this context, the states most frequently reported here match those reported by golfers during competition (telic-conformist-autic-mastery), a context which shares similar achievement-focused characteristics to a university lecture (Hudson & Walker, 2002). The fact that the autic state was, with very similar frequencies, combined with both the mastery and sympathy states presumably reflects the different experiences students had regarding achievement in this learning context. We might suggest that when students understood, enjoyed, and could follow the lecture, they reported experiencing autic mastery but when they fell behind, did not enjoy or understand the lecture, they experienced autic sympathy. We did not explore the implications of these metamotivational state experiences, but this would be a worthwhile question for future research.

Although our findings concurred with Cramer and Lafreniere's (2015) that the telic state was predominant, somewhat unexpectedly, unlike the decreased telic levels they observed throughout the lecture, relatively small numbers of students in our study reported reversals. Where reversals were identified, these were mainly between the telic and paratelic and the transactional states, with very few reversals reported between the negativistic and conformist states. Although the environment required conformity, and it is not surprising that students met expected norms, it is nevertheless interesting that very few expressed a desire to deviate from these norms and to experience a negativistic state. The percentages of students reporting reversals were quite consistent across the three lectures and whilst we cannot be certain, this prompts a need for further study into the reversibility phenomenon to determine if this is an artefact of the context, individual reversal tendencies, or is in fact, a coincidence. Apter (2013) has previously encouraged research to develop greater understanding of reversibility, starting with the simple question of how frequently people reverse. Our data suggest that reversibility was low but as we note above and Apter (2013) has commented, understanding of reversibility and its context-specificity has yet to be developed.

Our study has highlighted a number of reversal theory propositions, specifically reversibility, psychodiversity, and matching. Nonetheless, the conclusions we are able to draw are limited as we do not know if our findings are context specific or if they would be consistently demonstrated in these individuals and across different contexts over time. Longitudinal, intra-individual investigations over a range of different contexts would therefore help to further elucidate these concepts. Specifically in relation to Higher Education, studies are needed that explore metamotivational states and reversals experienced in learning environments other than a traditional lecture, including seminars, individual tutorials, independent learning and assessment contexts, practicals, and workshops, as it is unlikely that the telic, conformist, autic profile exhibited here will meet the requirements of these different environments. We collected our data prior to the global pandemic that started in February 2020 and since that time much teaching and learning in Higher Education has been online. Given that students are not always visible to, or interacting with, lecturers and their peers when online, understanding ways to use metamotivational states and reversals to optimise their engagement, affective responses and learning is therefore paramount in this online educational environment.

Although we identified *if* reversals took place, we did not explore the reasons for these reversals. This would be useful to explore in future research. Some criticism could be directed at our approach to measuring reversals and psychodiversity. First, the act of following instructions to complete a questionnaire about one's motivation could well induce the telic, conformist, and autic states. Whilst we attempted to maintain a robust approach to identifying whether or not a reversal had taken place, the incidence of missing data did affect our ability to capture all reversals experienced. This mostly affected the transactional states, with around 40% of potential responses missing across the three lectures. Some participants chose more than one of the four options whereas in other instances, none were chosen. It is possible that they were confused by the response format, that our instructions were not clear, or they felt that more than one state combination, or none, best reflected their motivational orientation at that time. It seems that some exploration into how people in-

terpret metamotivational state measures might be useful. Interestingly, in the development of their measure of psychodiversity, McDermott and colleagues (2021, p. 15) faced difficulties in constructing sufficient items for the transactional states that are reliable, valid, and "intelligible and meaningful" to the respondent. Nevertheless, their development of a psychodiversity questionnaire will help to facilitate much-needed research into this concept.

Despite the challenges outlined above, this study represents an important step forward in understanding acute motivational dynamics. By applying a context-spanning theory of motivational dynamism, which both qualifies and quantifies the nature and potential outcomes of motivational state shifts, we have been able to test some of its more complex predictions about the fluidity of motivational states. Our intra- and inter-individual data provide one of the first tests of the psychodiversity hypothesis and demonstrate emerging support for McDermott et al.'s (2021) proposal that the relationship between psychodiversity and well-being in its broadest sense is likely to be complex, multidimensional, and contextually influenced. For educators, it seems that supporting students' consistent experience of the telic, conformist, and autic states will enable cognitive and behavioral engagement and positive affect, at least in a traditional lecture context. However, to encourage agentic engagement in this setting, educators might need to help students to reverse to the paratelic, alloic, and negativistic state (cf. Cramer & Lafreniere, 2015). Future studies are needed to explore this proposal. Lastly, we identify three priority areas for future research on motivational dynamics: (i) the nature of metamotivational psychodiversity and its relationship with individual outcomes; (ii) the phenomenon of reversibility, including its potential individual and contextual characteristics, and (iii) state-matching and the control of reversals to meet environmental demands.

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