Assessing Competing and Combining Motives to Learn in College Students: A Self-Determination Theory Approach

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The present study used a mixed-methods, profile-centered approach to identify and evaluate common profiles of academic motivation among undergraduates. Cluster analysis revealed five motivational profiles based on Self-Determination Theory's (SDT) continuum of relative autonomy: a primarily autonomous group, an autonomous-introjected group, a primarily controlled group, a moderate group, and a high quantity group. Groups were examined for differences in academic achievement, engagement, emotions, and needs support based on survey responses (n = 177) and qualitative interviews (n = 20). Students in the primarily controlled group showed the least adaptive pattern, reporting the least needs support and engagement, and the most maladaptive academic emotions (i.e. low enjoyment, high shame). Profiles with higher levels of autonomous motives were the most adaptive. The richness of a mixed-methods approach both supported the central tenets of SDT and provided a more nuanced understanding of how different motive types operate in conjunction with one another.

Keywords: Self-Determination Theory, motivation, college students, profile-centered approaches, mixed-methods

Students are motivated to pursue higher education for a variety of reasons. These motivators come from both within (e.g., curiosity about particular subjects) and without (e.g., requirements for a future career). Such motivational factors are important to understand because they are reliable predictors of students' academic performance and retention, both over the transition to college and through the duration of the collegiate experience (Meens, Bakx, Klimstra, & Denissen, 2018; Richardson, Abraham, & Bond, 2012; Tinto, 1993; Wu, 2019). Moreover, the transition to college is often marked by new experiences that may act as a destabilizing force for previously held motivational patterns (Robinson et al., 2019). Compared to most secondary educational contexts, for example, the balance of intrinsic and extrinsic constraints may shift upon the transition to college (e.g., greater autonomy in class choice, less accountability for daily behaviors; Brooks & DuBois, 1995). The present study, therefore, focused on how these varying drivers to engage in academic work relate to student success.

One fruitful framework for conceptualizing college student motivation is Self-Determination Theory (SDT; Deci & Ryan, 2000; Ryan & Deci, 2000). This theory seeks to explain the range of human functioning that exists, and the psychological needs that must be met to achieve optimal functioning. This theory has been applied across various domains, and has been particularly useful in the field of education. According to SDT, it is critical to adopt a differentiated approach to motivation based on the degree of authenticity or self-endorsement of behaviors. Motives can range from wholly intrinsic (e.g., enjoyment of learning), to identified (e.g., recognition of a task as personally meaningful), to introjected (e.g., avoidance of feelings of guilt) to completely external to the self (e.g., seeking parental approval). More autonomous motives (intrinsic motivation, identified regulation) are theorized to be most adaptive and many studies in the domain of education using college samples confirm a link between autonomous motivation and high academic achievement (Taylor et al., 2014) and persistence (Guiffrida, Lynch, Wall & Abel, 2013; Meens, et al., 2018), but low levels of stress (Baker, 2004), and burnout (Pisarik, 2009).

SDT puts forth that in order to achieve this optimal autonomous motivation, individuals' basic psychological needs must be satisfied (Allen & Bowles, 2012; Deci, Vallerand, Pelletier & Ryan, 1991). An individual must feel that she has

enough ability to succeed, called competence, sufficient options to make meaningful choices about her tasks, called autonomy, and adequate support to feel connected to those around her, called relatedness (Ryan & Deci, 2000). These three basic needs of competence, autonomy, and relatedness provide a filter through which individuals interact with the world around them, particularly their successes and failures. Empirically, these needs have been shown to be connected directly to outcomes related to academics, mental health, and emotional well-being (Cordeiro, Paixão, Lens, Lacante & Sheldon, 2016; Hofer & Busch, 2011), as well as an individual's place on the continuum of motives described above (Allen & Bowles, 2012; Deci & Ryan, 2011).

A Profile-Centered Approach

While there clearly exists a benefit to maintaining autonomous motivation, it denies complexity to ignore that many, if not most, students do not consistently endorse exclusively autonomous motives. Rather, students are often propelled to study by a combination of motives, some autonomous and some more controlled (e.g., introjected or external regulation). Consider a student majoring in economics, funded partially by a merit-based scholarship. This student is highly autonomously motivated, reading ahead in the textbook, fueled by interest in the subject matter. Yet, because she knows she must maintain a 3.5 GPA to retain her scholarship, controlled motives drive her to put in several extra hours of work in the week before the midterm. One way to capture this complex interplay of motives is to approach research from a profile-centered standpoint. As opposed to variable-centered approaches, which analyze how each type of motivation predicts various outcomes, profile-centered approaches sort participants into like groups based on particular combinations of motives, and then consider how such groups may differ on a set of outcomes (see Magnusson, 2003).

Given the abundance of destabilizing motivational forces and the potential for rebalancing of motives upon the transition to college (Robinson et al., 2019), it is critical to examine motivational profiles during the collegiate years. The body of work using profile-centered approaches with college students to date has produced compelling, but limited, results. While the number and characteristics of groups has varied across studies, one consistent finding has been the identification of both (a) a group driven by primarily autonomous motives and (b) a "high quantity" group driven by high levels of both autonomous and controlled motives (Boiché & Stephan, 2014; Gillet, Morin & Reeve, 2017; Ratelle, Guay, Vallerand, Larose, & Senecal, 2007). A primarily autonomous group is defined by a high ratio of autonomous to controlled motives,

with the former typically being above average and the latter being below average. A high quantity group is typically defined by above average levels of both autonomous and controlled motives. Students with primarily autonomous motives have shown an adaptive pattern of correlates across studies, but evidence for the adaptability of a high quantity group is more mixed.

Considering the specific research on motivational profiles in collegiate populations, Ratelle et al. (2007, Study 3) found three profiles among first-year college students in Canada: the two profiles discussed above, and a profile with moderate levels of both motivators. Students in the primarily autonomous profile were significantly less likely to drop out of college than the other two groups, although their academic achievement did not differ from that of their high quantity peers. Boiché and Stephan's (2014) analyses of first-year college students revealed five profiles: the two common profiles, as well as a controlled group, a moderate group, and a group with low levels of all motivators. Students with a primarily autonomous profile attended a higher percentage of classes than their peers and achieved a higher GPA, thus demonstrating an advantage of primarily autonomous motivation over high quantity motivation. Gillet et al. (2017) found six profiles among their first-year students enrolled in a French university, including the common profiles, a moderate profile, a moderate profile with high amotivation, a controlled profile, and a profile low in all motivators. On measures of achievement and retention, the common profiles as well as the moderate profile appeared most adaptive. In this study, then, the high quantity group was just as adaptive as the group with primarily autonomous motivation.

Significantly, each of these studies incorporated all four motive types (i.e., intrinsic, identified, introjected, external) into the statistical procedure when forming profiles, thus investigating the full SDT continuum. One additional study identified motivational profiles among Belgian college students using "autonomous" and "controlled" composites as inputs to analysis, finding four profiles: the two common profiles, a primarily controlled group, and a low quantity group (Vansteenkiste, Sierens, Soenens, Luyckx, Lens, 2009, Study 2). Across a variety of correlates, the primarily autonomous and high quantity profiles were most adaptive, with the primarily autonomous group showing a distinct advantage over their high quantity peers in terms of lower test anxiety and higher autonomy support.

In summary, there is a relatively limited number of studies examining motivational profiles in college students, some consistency across studies in the particular profiles that have

been identified, but a mixed pattern in terms of the adaptive value of a high quantity profile. The present study, therefore, sought to expand on these findings in two major ways. First, after using all four motive types (intrinsic, identified, introjected, and external) to create profiles, we assessed a novel set of correlates in order to more comprehensively judge the adaptive value of each profile. These correlates were chosen based on prior research and potential relevance to SDT, with a goal of expanding the set of measured variables beyond achievement-related indicators to include well-being, learning processes, and contextual supports. Secondly, we adopted a mixed-methods approach (i.e., surveys and semi-structured interviews) to more richly characterize functioning and perceived needs support in each of the profiles. Both the richer set of correlates and the inclusion of a qualitative component were expected to shed light on the adaptive value of various motivational profiles among college students. These goals are described in greater detail below.

Correlates

Achievement. In order to understand the utility of main-taining each motivational profile, it is crucial to assess academic achievement, given that it serves as a traditional marker of success in education. Decades of theory and variable-centered research in SDT support the idea that achievement is promoted by autonomous motives and threatened by controlled motives (Deci et al., 1991). Profile-centered studies have largely confirmed the high academic achievement of primarily autonomous profiles and the relatively low achievement of primarily controlled profiles (e.g., Boiche & Stephan, 2014; Vansteenkiste et al., 2009). But – as noted above – there is some evidence that college students who exhibit high levels of both autonomous and controlled motives perform just as well as their primarily autonomous peers (Gillet et al., 2017; Ratelle et al., 2007). Perhaps pairing high autonomous motivation with some amount of controlled motivation is beneficial for keeping up with a high workload in a challenging collegiate environment. We expected this could be the case in the present research, however the limited number of relevant previous studies focusing on the collegiate level made it difficult to formulate a definitive hypothesis.

Emotions. While measuring achievement reveals inform-ation about students' outcomes, measuring emotions reveals the internal, often invisible, experiences that accompany those outcomes. Previous profile-centered studies with college populations have measured test-anxiety (Vansteenkiste et al., 2009) academic boredom, and positive affect (Gillet et al., 2017), finding adaptive emotions (i.e. decreased anxiety and boredom, increased positive affect) to be most common in

primarily autonomous profiles. When investigating motivational profiles through the lens of SDT, it seems logical to assess emotional correlates with strong theoretical connections to particular autonomous and controlled motivators. Because the concept of intrinsic motivation is predicated on participating in academic activities for pleasure (Deci & Ryan, 2000; Deci et al., 1991), we assessed academic enjoyment as a validity check on measures of autonomous motivation, expecting profiles high in autonomous motivation to also be high in enjoyment. Likewise, because introjected regulation is characterized by a desire to avoid feelings of guilt or shame, we assessed academic shame, and its opposite, pride, expecting both to be higher in profiles high in controlled motives.

Engagement. Among the most powerful factors at play in bridging the gap between motivation and achievement is the construct of engagement. This multifaceted construct encompasses the myriad ways students involve themselves in their education, and often serves as a partial mediator between stagnant demographic variables (e.g., socioeconomic status, race) and achievement (Reeve, Jang, Carrell, Jeon & Barch, 2004; Skinner & Belmont, 1993). Engagement has traditionally been broken down into three subset categories: behavioral engagement, referring to a student's involvement in activities surrounding her studies, emotional engagement, signifying a student's internal and expressed feelings in academic settings, and cognitive engagement, meaning a student's use of deep learning strategies in school (Skinner & Belmont, 1993). More recently, agentic engagement has been proposed in order to account for the ways students contribute to the flow of instruction (Reeve & Tseng, 2011).

Despite the robust relationship between engagement and achievement and the potential for engagement as a lever for intervention, it has been largely neglected in profile-centered research with college student populations. At the high school level, however, there is some evidence that both high quantity and primarily autonomous profiles exhibit more behavioral engagement than profiles with less autonomous motivation (Wormington, Corpus, & Anderson, 2012). The present study aims to add to understanding of engagement by connecting four forms of this construct to motivational profiles in a college sample. We expected to find all four types of engagement to be higher in profiles with more autonomous motivation.

Needs Support. According to SDT, autonomous motiv-ation will flourish when the learning context supports students' basic needs for competence, autonomy, and relatedness (Ryan & Deci, 2000). Empirically, these needs have been shown to

predict outcomes related to academics, mental health, and emotional well-being (Cordeiro, Paixão, Lens, Lacante & Sheldon, 2016; Deci & Ryan, 2011; Hofer & Busch, 2011). In the only profile-centered study to assess needs support among college students, Vansteenkiste et al. (2009) found the highest level of support for autonomy among their primarily autonomous group, and the highest levels of support for competence and relatedness among both primarily autonomous and high quantity profiles. The present study aims to further establish the relationship between needs support and motivational profiles in college students, which may suggest a potential factor driving students to adopt a particular set of motivations over another. In line with the tenets of SDT, we expected the primarily autonomous profile to report particularly high needs support.

Mixed-Methods Research

While measuring motivational profiles and their correlates indicates how students with different combinations of motivation experience collegiate life to some extent, quantitative survey research alone may not fully capture individual students' perspectives and understandings of their own experiences. Qualitative research provides the opportunity for individuals to volunteer information that researchers did not intentionally seek out. Consistent with the aim of adopting a profile-centered approach, including a qualitative component was expected to reveal nuances of how different groups function within a system.

Bridging the gap between quantitative and qualitative approaches to psychological research is the mixed-methods technique, which includes elements of both approaches in a single study. Mixed-methods research has the potential to combine the ease and power of data collection available through quantitative methods with the in-depth richness offered by qualitative methods, often producing stronger and more meaningful results (Greene, Caracelli & Graham, 1989; Johnson & Onwuegbuzie, 2004). The present study included both a quantitative survey component that was used to establish motivational profiles and their correlates and a qualitative interview component focusing on a subset of students representing each motivational profile. To our knowledge, a mixed-methods, profile-centered approach in the SDT tradition has not yet been used with a collegiate population. One study with younger students, however, can provide a useful model: Corpus, Wormington, and Haimovitz (2016) interviewed elementary and middle school students representing each of four motivational profiles they found based on responses to a survey assessing intrinsic and extrinsic motivations, producing qualitative data which allowed for a

deeper understanding of each profile. Likewise, the present study aimed to solicit novel information from participants through interviews that would aid in characterizing each motivational profile found, and lend insight into their relationships with the correlates measured.

Methods

Participants

Participants in the online survey portion of the study were 181 undergraduates (48% female) currently enrolled at a small liberal arts college in the Northwestern United States. First-year students made up the largest group of participants (37%), followed by seniors (26%), and then juniors (20%), and sophomores (16%). Students also reported on their major area of study: 41% social science, 32% natural science, and 27% humanities. No other demographic data were collected. A subset of the survey respondents (n = 20; 55% female) participated in a subsequent face-to-face interview. Survey participants were recruited using postings on campus and social media. Interview participants were randomly chosen from each profile group, with the interviewer blind to individuals' profile membership. The Qualitative Results section presents additional information about interview participants.

Measures

The survey included 89 items, as detailed below.

Motivation. Students' academic motivation was measured with the Academic Self-Regulation Scale (ASRS), as adapted by Vansteenkiste and colleagues (2009). This 16-item scale asked participants to rate their agreement with responses to the question "Why are you studying in general?," on a Likert scale ranging from 1 (completely not important) to 5 (very important). Answers corresponded with intrinsic (e.g. "because it's fun"), identified (e.g. "because it is personally important to me"), introjected (e.g. "because I would feel guilty if I didn't study"), and external (e.g. "because I'm supposed to do so") forms of regulation. Internal consistency in the present study was satisfactory for each subscale (intrinsic $\alpha = .88$, identified $\alpha = .76$, introjected $\alpha = .82$, external $\alpha = .82$).

Needs Support. Students' needs support was measured using the shortened form (24 items) of the Teacher as Social Context Measure (TASC; Belmont, Skinner, Wellborn, & Connell, 1988). This scale was altered slightly from its original form in order to fit with the college context ("teacher" was changed to "professors" and "schoolwork" was changed to "work"). Using three subscales, this measure assessed experienced support of the autonomy need (autonomy support;

e.g. "my professors listen to my ideas," 8 items), relatedness need (teacher involvement; e.g. "my professors talk with me," 8 items), and competence need (teacher provision of structure; e.g. "my professors make sure I understand before they go on," 8 items). Participants responded using a 4-point Likert scale. Internal consistency in the present study was poor for autonomy support (α = .58) but satisfactory for the relatedness (α = .82) and competence (α = .75) needs support.

Engagement. The 10-item Engagement vs. Disaffection with Learning Scale (Skinner, Furrer, Marchland, & Kindermann, 2008) was used to assess behavioral engagement (e.g. "I pay attention in class," five items) and emotional engagement (e.g. "when I'm in class, I feel good," five items). Cognitive engagement was measured using the four items that best captured deep learning strategies from Wolters' (2004) eight-item scale of cognitive strategy use (e.g. "when doing work for my classes, I try to relate what I'm learning to what I already know"). Agentic engagement was measured with a five-item scale developed by Reeve (2013), although items were adjusted to fit the college context, with "teacher" being changed to "professors" (e.g., "I let my professors know what I am interested in"). Participants responded using a 4-point Likert scale. Internal consistency in the present study was satisfactory for all measures (behavioral α = .71, emotional α = .84, cognitive α = .73, agentic α = .84).

Academic Emotions. Emotions experienced in and around school were measured using the three subscales (30 items total) from the Achievement Emotions Questionnaire (AEQ; Pekrun, Goetz, Titz, & Perry, 2002). The Class-Related Enjoyment subscale (10 items) was used to measure students' feelings of enjoyment before, during, and after class (e.g. "during class I enjoy being in class"); the Class-Related Pride subscale (9 items) assessed participants' feelings of pride, also before, during, and after class (e.g. "after class, I am proud of myself"); the Class-Related Shame subscale (11 items) was used to measure feelings of shame surrounding the class experience (e.g. "during class, I get embarrassed"). These subscales were chosen because of their potential theoretical relevance to the autonomous and controlled forms of motivation being assessed. Responses were recorded on a 5-point Likert scale and internal consistency in the present study was good for each subscale (enjoyment α = .90, pride α = .82, shame α = .92).

Academic Achievement. Participants' cumulative grade point average (GPA) measured on a four-point scale was retrieved from institutional records.

Interview Protocol

The interview protocol was created with the intention of

both assessing theoretically based questions and eliciting novel information. Both unstructured interview techniques, wherein open-ended questions prompt a variety of descriptive answers, and structured interview techniques, wherein a particular set of questions are asked in a particular order, had potential to provide value here (De Groot, 2002). A semi-structured interview protocol, incorporating specific but open-ended questions, was chosen, in order to capitalize on the strengths and minimize the weaknesses of these two approaches.

The first section of the interview aimed to expand on quan-titative information gathered by the motivation and needs support measures. Participants were asked about the support, or lack thereof, they experienced for autonomy, competence, and relatedness, while attending college. More specifically, participants were asked to describe how frequently, and in what situations, they had the opportunity to make choices regarding their academic work (autonomy), to what degree they felt capable of succeeding academically (competence), and how often they experienced a sense of belonging among their peers and professors (relatedness).

The second section consisted of questions about partici-pants' experiences of motivation in school. Participants were encouraged to detail anecdotes of positive and negative experiences surrounding motivation and to characterize their own motivation more broadly. Here the intention was for participants to provide richer detail on their motivation that would not be captured by the motivation survey items. The open-ended nature of these questions also served as an opportunity to collect data on potential differences between profile groups not captured in the quantitative data. At this point, the interviewer provided a brief explanation of the autonomous and controlled types of motivation proposed by SDT and asked participants to consider their own motivation in terms of this framework.

Interviews lasted 20-30 minutes, and were conducted by the first author, who was blind to participants' survey responses.

Results

Missing data was minimal: 0% for the motivation items, .5% for GPA, 1.7% for the needs support items, 4.5% for the engagement items, and 9.6% for the emotion items, which came last in the survey. Listwise deletion was therefore used for all analyses reported below.

Quantitative Data

Table 1 provides descriptive statistics and correlations among all the measured variables. As predicted by SDT, the different motive types related to one another in a simplex pattern, such that motives closer to one another along the

Table 1: *Correlations and Descriptive Statistics for All Variables*

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. External Reg.	–														
2. Introjected Reg.	.40**	–													
3. Identified Reg.	−.18*	.13	–												
4. Intrinsic Mot.	−.18*	.02	.67**	–											
5. Autonomy Support	.23**	.04	.45**	.45**	–										
6. Involvement	.25**	−.03	.38**	.35**	.67**	–									
7. Structure	−.27**	−.09	.33**	.35**	.63**	.66**	–								
8. Enjoyment	−.25**	.05	.54**	.67**	.59**	.53**	.52**	–							
9. Pride	−.07	.25**	.39**	.41**	.50**	.48**	.39**	.74**	–						
10. Shame	.29**	.31**	−.17*	−.20**	−.31**	−.34**	−.38**	−.27**	.21**	–					
11. Behavioral Eng.	−.14	.10	.39**	.39**	.33**	.31**	.35**	.48**	.42**	−.29**	–				
12. Emotional Eng.	−.34**	−.00	.50**	.57**	.59**	.52**	.51**	.80**	.65**	−.35**	.58**	–			
13. Cognitive Eng.	−.19*	−.14	.41**	.37**	.34**	.30**	.30**	.39**	.30**	−.27**	.49**	.51**	–		
14. Agentic Eng.	−.12	−.05	.32**	.37**	.46**	.53**	.49**	.56**	.53**	−.58**	.57**	.61**	.43**	–	
15. GPA	−.23**	.06	.21**	.25**	.23**	.17*	.34**	.20*	.12	−.26**	.23**	.29**	.16*	.23*	–
Mean	2.51	3.12	4.18	3.73	3.08	3.05	2.91	3.33	3.26	2.61	3.21	3.17	3.20	2.76	3.18
Standard Deviation	.93	.96	.67	.93	.46	.53	.49	.82	.72	.97	.51	.56	.57	.70	.52
N	177	177	177	177	174	174	174	160	160	160	169	169	169	169	176

Note: Reg. = Regulation; Mot. = Motivation; Eng. = Engagement; *p* < .05, **p* < .01

continuum of self-regulation (e.g., intrinsic and identified) correlated more positively with one another than with types that are further away (e.g., intrinsic and external). Relationships among the four motive types and the correlates of emotion, engagement, and needs support were all consistent with theory and prior research. External regulation was negatively correlated with enjoyment, emotional and cognitive engagement, autonomy support, involvement, and structure. Introjected regulation was positively correlated with both pride and shame, but not significantly related to enjoyment, engagement, or needs support. The two types of autonomous motivation were both correlated positively with all variables, discounting shame, with which they correlated negatively.

Cluster Analysis

Because clustering procedures are highly sensitive to out-liers in the data, four cases that were greater than 2.5 standard deviations from the mean on one or more of the four subscales of the ASRS were removed, leaving a clustering sample of 177. Participants' answers to the four subscales of the ASRS (i.e., intrinsic, identified, introjected, external) were used as inputs to a two-step clustering procedure, as recommended by Hair, Anderson, Tatham, and Black (1998).

Ward's method of hierarchical clustering was used in the first step of the cluster analysis. Within this procedure, each participant begins in their own cluster, and clusters are systematically merged based on similarity until all data points are in one cluster. Based on previous related research (Boiche & Stephan, 2014; Ratelle et al., 2007; Vansteenkiste et al., 2009), solutions of three, four, five, and six clusters were cons-

-idered. Based on the agglomeration matrix, dendrogram, and percent variance explained, a 5 cluster solution was chosen. This solution explained 51% of the variance in external regulation, 70% in introjected regulation, 42% in identified regulation, and 64% in intrinsic motivation, which is comparable to the variance explained in previous research (e.g., 64%-66% in Vansteenkiste et al. 2009), and exceeded the recommended 50% of variance explained (Milligan & Cooper, 1985) on three of the four constituting dimensions. A four-cluster solution was also considered because of its comparable explanatory power, but the five cluster solution was chosen because it included a theoretically interesting additional cluster, which provided a meaningful connection to the correlates tested.

In the second step of the cluster analysis, a non-hierarchical k-means procedure was used to refine the clusters, maximizing homogeneity within clusters and heterogeneity across clusters. The refined clusters explained 61% of the variance in external regulation, 67% in introjected regulation, 43% in identified regulation, and 68% in intrinsic motivation. A double-split cross-validation procedure (see Breckenridge, 2000) resulted in a kappa of .52, which is above the .40 threshold for moderate agreement (see Fleiss, 1981) and suggests that the solution is likely stable and replicable.

The final cluster solution is presented in Figure 1. The primarily autonomous group (*n* = 40) consisted of students with relatively high levels of intrinsic motivation and above average identified regulation but relatively low levels of introjected and external regulation. The *autonomous-introjected group* (*n* = 29) was made up of students with

Figure 1: *Standardized (z) Scores of Academic Motive Types by Profile*
PA = Primarily Autonomous, A-I = Autonomous-Introjected, PC = Primarily Controlled,
HQ = High Quantity
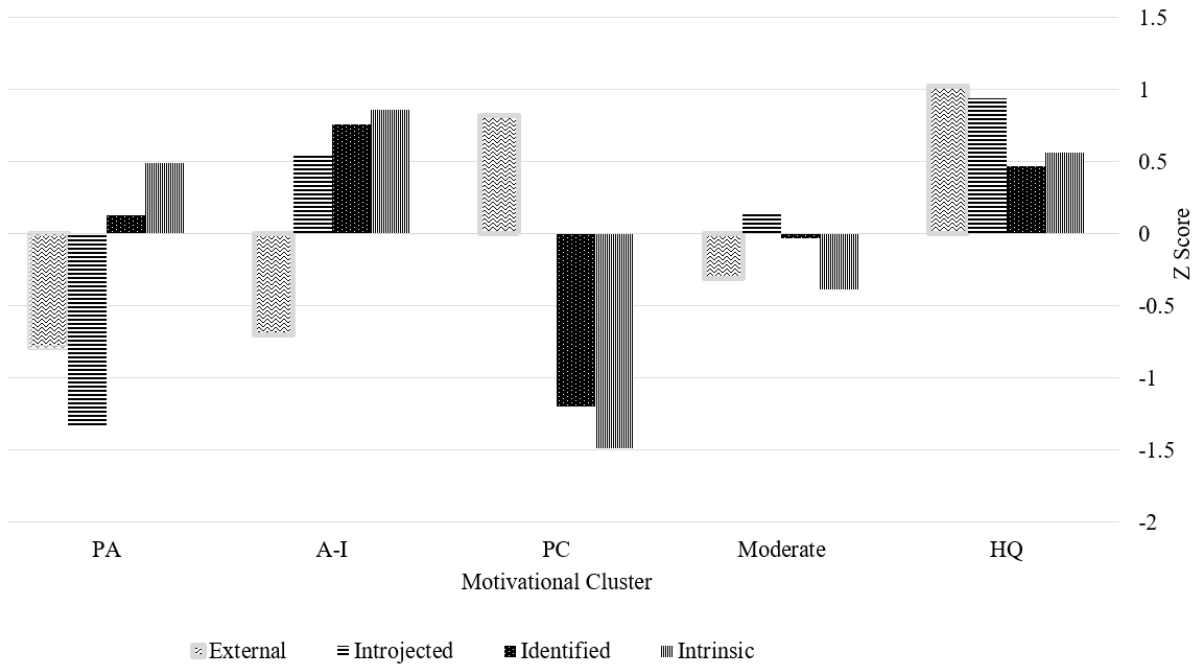
relatively high levels of intrinsic motivation, identified regulation, and introjected regulation, but relatively low levels of external regulation. The primarily controlled group ($n = 28$) included students with relatively low levels of intrinsic motivation and identified regulation, average introjected regulation, and relatively high levels of external regulation. The moderate group ($n = 42$) was composed of students with near average scores on each of the inputs. Lastly, the high quantity group ($n = 38$) included participants with relatively high levels of each type of motivation. A series of one-way ANOVAs affirmed that these clusters significantly differed on the four component motivation types (see Table 2). Chi-Square tests revealed no significant differences between clusters in terms of their gender composition, $\chi2(4, N = 177) = 7.74$, *ns*, participant class level, $\chi2(12, N = 175) = 16.46$, *ns*, or participant major, $\chi2 (8, N = 177) = 7.00$, *ns*.

Correlates

One-way ANOVAs were conducted to determine whether the five cluster groups differed on each of the measured correlates. Table 2 reports test statistics as well as the means and standard deviations for each correlate by cluster group. Across all correlates, the primarily controlled group reported less favorable outcomes than the other four groups.

Needs Support. All three needs support variables showed significant differences among profile groups, $Fs(4, 169) \geq 6.08$, $ps \leq .001$, $\eta2s \geq .13$. For autonomy support, provision of structure, and professor involvement, the primarily controlled group reported less needs support (Ms from 2.53 to 2.68) than their peers in the other four groups (Ms from 2.91 to 3.29).

Engagement. One-way ANOVAs revealed that group membership had a significant effect on all four forms of engagement, $Fs(4, 164) \geq 6.43$, $ps \leq .001$, $\eta2s \geq .14$. The primarily controlled group reported the lowest levels of engagement across all four indices (Ms from 2.17 to 2.85), and the autonomous-introjected group reported the highest levels (Ms from 2.98 to 3.56). The autonomous-introjected group did not significantly differ from the primarily autonomous or high quantity groups on any of the four indices except for behavioral engagement, in which case it was superior to all other groups.

Emotions. There was also a significant difference across groups in all three types of academic emotions, $Fs(4, 155) \geq 3.64$, ps $\leq .01$, $\eta2s \geq .09$. The primarily controlled group reported the lowest levels of pride ($M = 2.73$) and enjoyment ($M = 2.42$), particularly compared to the autonomous-introjected and high quantity groups (Ms from 3.57 to 3.83). The primarily controlled group also reported the highest levels

Table 2: *Mean Values of Motivation Dimensions and Outcome Variables by Profile*

Variable	Primarily Autonomous $n = 40$	Autonomous –Introjected $n = 29$	Primarily Controlled $n = 28$	Moderate $n = 42$	High Quantity $n = 38$	F	η^2
Motivation Dimensions							
Intrinsic Motivation	4.16 (.65)$_a$	4.51 (.34)$_a$	2.25 (.48)$_b$	3.31 (.55)$_c$	4.23 (.57)$_a$	89.17**	.68
Identified Motivation	4.24 (.65)$_{ad}$	4.70 (.38)$_b$	3.27 (.54)$_c$	4.12 (.40)$_d$	4.48 (.53)$_{ab}$	32.90**	.43
Introjected Motivation	1.79 (.42)$_a$	3.63 (.47)$_b$	3.09 (.82)$_c$	3.23 (.51)$_c$	4.01 (.55)$_d$	88.57**	.67
Extrinsic Motivation	1.78 (.09)$_a$	1.86 (.11)$_{ac}$	3.31 (.11)$_b$	2.24 (.09)$_c$	3.50 (.10)$_b$	65.80**	.61
Needs Support							
Autonomy Support	3.13 (.51)$_a$	3.29 (.36)$_a$	2.68 (.48)$_b$	3.07 (.41)$_a$	3.19 (.35)$_a$	8.40**	.17
Structure	3.07 (.49)$_a$	3.03 (.50)$_a$	2.53 (.42)$_b$	2.92 (.43)$_a$	2.91 (.48)$_a$	6.08**	.13
Involvement	3.17 (.46)$_a$	3.15 (.50)$_a$	2.59 (.50)$_b$	3.11 (.41)$_a$	3.09 (.61)$_a$	6.75**	.14
Engagement							
Behavioral Engagement	3.22 (.50)$_a$	3.56 (.40)$_b$	2.85 (.46)$_c$	3.10 (.50)$_{ac}$	3.33 (.44)$_{ad}$	8.85**	.17
Cognitive Engagement	3.37 (.53)$_{ac}$	3.44 (.52)$_a$	2.82 (.55)$_b$	3.07 (.50)$_c$	3.28 (.57)$_{ac}$	6.43**	.14
Emotional Engagement	3.35 (.48)$_{ac}$	3.54 (.41)$_a$	2.53 (.49)$_b$	3.08 (.46)$_c$	3.32 (.48)$_{ac}$	18.82**	.32
Agentic Engagement	2.86 (.75)$_a$	2.98 (.67)$_a$	2.17 (.52)$_b$	2.75 (.71)$_a$	2.95 (.56)$_a$	7.08**	.15
Academic Emotions							
Pride	3.14 (.67)$_{ab}$	3.57 (.71)$_{ac}$	2.73 (.67)$_b$	3.27 (.54)$_{ac}$	3.61 (.75)$_c$	8.15**	.17
Shame	2.18 (.66)$_a$	2.49 (1.02)$_{ab}$	3.07 (1.17)$_b$	2.65 (.89)$_{ab}$	2.71 (.97)$_{ab}$	3.64**	.09
Enjoyment	3.49 (.12)$_{ac}$	3.83 (.14)$_a$	2.42 (.13)$_b$	3.29 (.11)$_c$	3.59 (.12)$_{ac}$	16.35**	.30
GPA	3.19 (.08)$_{ab}$	3.49 (.10)$_b$	2.88 (.10)$_a$	3.16 (.08)$_{ab}$	3.21 (.09)$_{ab}$	4.85**	.11

Note: Cell values are means with standard deviations in parentheses. Subscripts indicate significant differences in mean values across motivational profiles according to Tukey's HSD test. * $p < .05$. ** $p < .01$.

of shame ($M = 3.07$), particularly compared to the primarily autonomous group ($M = 2.18$).

Achievement. A one-way ANOVA revealed a significant effect of profile group on achievement, $F(4, 158) = 4.85$, $p < .01$, $\eta2 = .11$. Once again, the primarily controlled group showed the poorest outcome, with an average GPA of 2.88 compared to averages ranging from 3.16 to a high of 3.49 in the autonomous-introjected group.

Qualitative Data

Of the 20 participants interviewed, eight were in the prima--rily autonomous group, four were in the autonomous-introjected group, two were in the primarily controlled group, three were in the moderate group, and three were in the high quantity group. Although we had targeted approximately four interview participants per group, the group sizes varied due to differences in response rate and recruitment errors.[1]

Transcripts were analyzed by the first author using thematic analysis (Braun & Clarke, 2006). In the first step of this process, data were combed through for codes, defined as the most basic elements that appeared relevant, resulting in 38 distinct, but not mutually exclusive, codes. These codes were determined using an inductive, bottom-up approach, meaning

they reflected common utterances in the data and were developed with the goal of capturing participants' experiences. Frequency of codes within the sample ranged from 2 to 14 participants, with an average of 6.58 participants receiving each of the 38 codes. These codes were then sorted into broader themes that appeared with some frequency across the dataset, and each interview was again considered in light of these broader themes. The first author then became unblinded to participants' motivational profiles and considered the distribution of codes and themes within each profile category. This thematic analysis procedure allowed for commonalities within each motivational profile to be identified and examined for their relevance to the research questions, as described below (Braun & Clarke, 2012).

Primarily Autonomous Profile. The primarily autono--mous group stood out in terms of a high level of needs support. A great majority of participants in this group (6 of 8) said that they frequently felt competent in school, compared to half or less of those interviewed in the other profile groups. Of particular note, on occasions when needs supports were not provided or easily accessed, individuals in this group made a point of seeking them out. One participant said, "As a transfer student…I'm definitely on the more alienated side of belong-

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[1] In order to ensure that the first author remained blind throughout the interview and coding process, the second author used participants' survey responses to generate a list of candidates for interview recruitment that was evenly distributed across clusters. When that list was exhausted, the second author provided a set of additional interview candidates, which mistakenly overrepresented the primarily autonomous cluster. This disparity was not realized until the first author was unblinded to profile membership following the coding process. The response rates across groups was as follows: primarily autonomous - 8 of 10 recruited (80%); autonomous-introjected - 4 of 8 recruited (50%); primarily controlled - 2 of 7 recruited (29%); moderate - 3 of 5 recruited (60%); high quantity - 3 of 9 recruited (33%).

-ingness...so I've actually really had to work at that to get a sense of belongingness." These students also reported being able to take solace in their community when their needs were not being supported. A participant said, "I often feel like the dumbest person in the room, but I also often am like, everyone feels like the dumbest person in the room, so it's not a big deal."

As might be expected based on theoretical work on intrin--sic motivation, primarily autonomous participants often discussed their enjoyment and interest in their academic pursuits. When this group recalled experiencing moments of high motivation, personal interest was often a key motivator. One participant said, "I just really enjoyed [chemistry] and I just like doing all the problem sets," and another volunteered "I know a lot of people probably don't like problem sets, but I like them...it could take six hours but I'm just motivated the whole time."

Primarily Controlled Profile. Participants in this group spoke about the lack of needs support leading to a sense of alienation and amotivation. Both participants in this group (2 of 2) said they only occasionally feel a sense of belonging. One student said, "I've definitely felt belonging in certain groups on campus, so extracurricular groups, or friends, or people in my dorm. It's harder to feel that in a classroom." And another reported, "There is very little interaction between you and your classmates, and it's very easy to feel like you are struggling alone." Likewise, both of those interviewed reported only occasionally feeling competent in school. One said, "It's hard, because you have to figure out what the expectation is before you can figure out how reasonable it is, and it's usually too late at that point."

Like the students in the primarily autonomous group, these participants reported that a key part of finding adequate needs support in school is seeking out that support for oneself. Unlike the participants in the primarily autonomous group, though, primarily controlled participants saw pursuing these supports as a barrier to success, rather than an opportunity to achieve it. When discussing a lack of feeling competent in school, one participant reported, "Sometimes I feel like that where teachers are putting me in the position where they are giving me the tools to succeed and do well, it does come down to the student a little bit." The provision of freedom and expectation of agency in making use of these resources -- which seemed to allow primarily autonomous students to feel responsible and competent -- left primarily controlled students feeling unsupported.

Autonomous-Introjected Profile. In the domain of needs support, participants in the autonomous-introjected group expressed some characteristics reminiscent of the primarily

autonomous cluster, and some more in line with the primarily controlled cluster. While they did not report the same low needs support as the primary controlled group, most participants in this cluster (3 of 4) did describe feeling some level of incompetence. One participant said, "I always feel competent, but just sometimes in the moment I feel like I'm on a different page," and another said, "I think I've felt more competent the more time I spend here." Interestingly, half of the autonomous-introjected group (2 of 4) volunteered information on feelings of imposter syndrome during their college careers. One said, "I know that I belong [at college] but don't always feel like I belong... like impostor syndrome." This can contribute significantly to our understanding of this cluster, as none of the other participants interviewed mentioned experiencing impostor syndrome in school.

More than those in other groups, participants in the autono-mous-introjected group reported experiencing high motivation when learning was relational in nature. When asked about situations of high motivation, all 4 participants mentioned interaction with a professor, either in receiving constructive feedback or building a close relationship. One participant said, "If you feel like your professors believe in you, you can't let them down." Another student described the importance of cultivating a feeling of belongingness along peers in the classroom: "Right now I'm in a class where...it can feel pretty intimidating because I'm not part of that group."

Moderate Profile. Participants with a moderate profile appeared to place a high value on the support they received for autonomy, competence, and relatedness. One of the three participants said, "people around me definitely push me, and that's why I really like the community I have here." The same participant named competence as a key motivator, saying his motivation comes from "just having enough knowledge to research whatever I want and feel as though I have enough working knowledge to find things and understand them even though I know nothing about them."

Despite this, for participants in this group, motivation during college seemed to vary over time and situation. Specifically, these participants often discussed a change in motivation across the years of college. When describing experiences of competence, one said, "I think the first two years very little, but the last two years I've felt pretty competent." When another participant discussed belongingness, she said "only in my junior year [I felt a sense of belonging], and it was only because the department was so small.... so I felt like that created this really great group dynamic where I felt like I belonged...now none of us talk."

High Quantity Profile. Participants in the high quantity group placed significant value on the support they received for

belongingness in school, particularly involving interaction with professors. Two of three participants named interactions with professors as a motivator, and lack of interaction with professors as a factor that thwarted motivation. One participant explained the value she places in this, saying "The thesis has been the project I have felt most motivated on, that is because I have an advisor who is genuinely listening to what I have to say." Another said she is most motivated "when a professor clearly is caring about whether or not I do well." Thus, the relatedness need seemed to be prominent in this group.

Participants in this group reported experiencing varying degrees of needs support over their time in college, however all reported that they currently were feeling well supported. When asked about competence, one senior said, "When you start out your freshman [year]...you're just really aware of what you are doing.... But I feel like senior year it comes naturally." Though many of these participants reported not having always felt fully motivated at college, unlike those in the autonomous-introjected group, they did not discuss experiencing imposter syndrome. One participant said, "I know a lot of people...are like, everyone is so much smarter than I am, and I've been really lucky I've never felt that way, I've always felt like I am good enough to be [here]."

Discussion

By incorporating both qualitative and quantitative data to this profile-centered analysis of academic motivation, the present study represents a rich characterization of motivational profiles found in college students. This process allowed for the identification of five combinations of motive types that naturally occurred among undergraduates attending a liberal arts college. The five cluster solution found here is not uncommon amongst studies of this sort. The primarily autonomous, primarily controlled, and high quantity clusters have each been found by all four previous profile-centered studies of college students (Boiche & Stephan, 2014; Gillet et al., 2017; Ratelle et al., 2007; Vansteenkiste et al., 2009), and two previous studies identified something similar to the moderate cluster (Boiche & Stephan, 2014; Gillet et al., 2017). The autonomous-introjected cluster found here, however, was not present in any of these studies, and is rarely found in profile-centered studies of any age group. To our knowledge, only one study has previously found a similar profile, in a high school physical education class context (Boiché, Sarrazin, Grouzet, Pelletier, & Chanal, 2008). The presence of this profile, and its status as the highest achieving of the sample, speaks to the importance of imputing the full set of motive types into cluster analysis rather than the autonomous and controlled composites.

By examining a rich and novel set of correlates, inferences could be drawn about which particular combinations of motives appeared to be most and least adaptive in this context. Considering both the quantitative and qualitative findings, the primarily controlled profile distinguished itself as the least adaptive, with the least experienced needs support and engagement, most maladaptive academic emotions, and lowest GPA of the groups. This result is consistent with SDT, which proposes that students who are motivated by entirely controlled factors will fare much worse than those motivated by autonomous factors (see Ryan & Deci, 2000). This is further confirmed by the qualitative data, in which primarily controlled participants reported feeling a lack of belongingness and competence in school.

SDT also posits, however, that students who are exclusive-ly motivated by autonomous factors will experience the most optimal outcomes, compared to students who are motivated by a combination of factors. Though the primarily autonomous group here was in no way maladaptive, it was consistently matched by the high quantity group and even outmatched by the autonomous-introjected group on quantitative correlates. This was true for engagement, academic enjoyment, and achievement, with the autonomous-introjected group reporting the highest scores on these measures. Similar to several previous profile-centered studies with college students (Gillet et al., 2017; Ratelle et al., 2007), then, the primarily autonomous group did not distinguish itself in terms of academic achievement.

The qualitative data paints somewhat of a different picture, highlighting drawbacks present in profiles that incorporate high levels of controlled motivation alongside autonomous motivation, that did not arise in the quantitative data. For the autonomous-introjected profile, this manifested in participants more frequently experiencing imposter syndrome, while those in the high quantity profile reported some variation in feelings of competence throughout their time in college. Contrastingly, those in the primarily autonomous group reported feeling responsible for and capable of seeking out resources on their own when needs support was lacking. Although this group did not distinguish itself on the quantitative measures, this result points to there being some additional benefits to maintaining a primarily autonomous approach over one with higher levels of controlled motivation.

Why then, despite this, did the autonomous-introjected group distinguish itself as most adaptive on several of the quantitative measures? Results of Boiché et al. (2008) may offer some insight. In this study, a similar autonomous-introjected profile was found to be the highest achieving in a compulsory high school physical education class. Boiché and colleagues theorize that, in this context, participants with

higher introjected motivation became more behaviorally engaged, in order to avoid feelings of guilt that may have come from exhibiting noticeably low engagement. Introjected motivation, then, may be compatible with autonomous motivation in a context-dependent manner. It is possible that when classes are compulsory, as in Boiché et al. (2008), or highly demanding, as in the present study, some amount of obligation-based motivation may be advantageous for completing the workload needed to achieve highly. If this is true, it is logical that introjected motivation, being closer to the autonomous side of the SDT continuum, would be optimal. Drawing on even more controlled forms of motivation, such as external regulation, could perhaps also push students to complete their workloads but that advantage may ultimately be negated by the costs of externally imposed pressure to achieve.

Additional research is needed to explore the potential benefits of incorporating introjected motives alongside autonomous ones in particular contexts. This issue notwithstanding, it is clear that profiles with the highest levels of autonomous motivation showed the most adaptive outcomes in terms of engagement, well-being, and success in school. In other words, autonomous motivation itself appears to be the critical factor in determining the adaptability of a motivational pattern. The degree to which an individual simultaneously maintains various controlled motives may be either helpful, or inactive, depending on context.

Implications for Instruction

Taken together, the quantitative and qualitative portions of this study offer several practical implications for supporting students in the collegiate environment. Although the autonomous-introjected group generally reported the most adaptive pattern of responses in the survey data, it would seem misguided to advocate for encouraging students to feel more guilt and shame surrounding academics, particularly as the qualitative data revealed concerns about incompetence in this group. What is clear, however, is that students should be led away from experiencing controlled motivation without accompanying high levels of autonomous motivation to serve as a buffer. Indeed, the present findings indicate that students are most successful when they are attending college because they enjoy and are interested in their studies, regardless of what other factors may also motivate them to learn.

One clear path to heightening students' autonomous motiv--ation in school is to increase their feelings of autonomy, competence, and relatedness (Deci & Ryan, 2011; Ryan & Deci, 2000). Indeed, interventions aimed at providing support for these three needs have been shown to enhance both motivation and achievement (e.g., Cheon & Reeve, 2015; Kaur, Hashim & Norman, 2015; Soenens & Vansteenkiste,

2005; Vansteenkiste, Simons, Lens, Sheldon, & Deci, 2004; Walton & Brady, 2017). In an incredibly non-invasive intervention, Vansteenkiste and colleagues (2004) found that simply altering the text of reading material, from using statements like "you must" to more autonomy supportive "you may choose to," led to increased autonomous motivation, deeper processing of information, and higher performance among college students. Using a more involved intervention, Cheon and Reeve (2015) trained teachers through a series of professional development workshops to use more autonomy-supportive practices, which led to students feeling stronger support for both autonomy and competence over time compared to those in a control condition. Finally, regarding the relatedness need, multiple interventions have shown that facilitating social connections among students and faculty in collegiate settings ultimately results in a stronger sense of belonging and higher academic achievement (see Walton & Brady, 2017).

It is critical to consider what lever researchers can activate to achieve the most significant result in terms of heightening needs support. In the present study, participants spoke frequently about their professors when asked to discuss their experiences with needs support. Though interactions with professors most clearly fall within the domain of relatedness, participants in each profile group discussed these interactions as being supportive of competence and autonomy as well. Discussions with professors seemed to help students feel empowered to choose their own academic path (autonomy), positive feedback from professors allowed students to feel competent in their abilities (competence), and social interactions with professors led students to feel a sense of belonging in their environment (relatedness). This was reflected clearly in the qualitative data across all profile groups. One participant in the primarily autonomous group said, "professors at [college] have inspired excellence and motivated me to work really hard on projects." Even participants in the primarily controlled group echoed this sentiment by citing positive feedback from professors as a source of competence: "In the first days of class, before I lost all my shit and stopped being a good student, [I felt competent when] my professors would tell me I was doing well."

Perhaps, then, one step in solving the problem of primarily controlled motivation is implementing interventions that encourage high quality, autonomy supportive interactions between professors and students (Strayhorn, 2012; Trolian et al., 2016). Such interventions may be as simple as educating faculty about the impact they can have on students, which could be achieved through faculty workshops, distribution of reading materials through university teaching and learning centers, or even provision of incentives for faculty to engage

in out-of-class activities alongside students. Importantly, these relationships need not only be developed when students are succeeding academically, as this can exclude those who are most in need of encouragement. Though it may be trickier to provide, there is room for connection and support even when students are not currently meeting academic standards. As one participant in the primarily controlled group said, "my paper conferences with my [Humanities] conference leader… always made me feel like I could succeed, even if I wasn't currently successful." For all students, these supportive relationships with faculty may be particularly important to foster during the early college years. It is at this time when new experiences tend to destabilize previously held motivational patterns (Robinson et al., 2019) and interpersonal interactions tend to make the difference between retention versus dropout (Tinto, 1993).

Limitations and Future Directions

The present study raises a number of important questions for future work. Given the correlational nature of our data, establishing the causal relationship among constructs in future work is essential. While we theorized that needs support contributed to profile membership and profile membership led to academic emotions, it is possible that the opposite is true, or that these things simply occurred in conjunction with one another due to a third, unmeasured variable. In order to assess these questions from a causal standpoint, future studies could make use of classroom interventions aimed at altering one construct (e.g. needs support) in order to assess the causal effect this has on another (e.g. profile membership).

Though much can be gleaned from the richness of the inter- -view data, the sample size was only a small subset, 11%, of the total participants. Additionally, the sample of interviewed participants was uneven across profiles, with substantially more participants from the primarily autonomous group consenting to be interviewed. Retrospectively, that more participants from this group than others were interested in participating in an interview is not surprising, as these participants maintain the style of motivation that is most endorsed by the liberal arts college culture. This type of motivation is likely the easiest to discuss subscribing to, whereas participants with more controlled motivation may have been unwilling to spend 20 minutes talking about their potentially stigmatized style of motivation. Including more of their perspectives in future research would enrich our understanding of how the more controlled motivational profiles play out in daily collegiate life.

Conclusion

Using a profile-centered approach, the present study show- -ed that students characterized by primarily controlled motives exhibited maladaptive responses in terms of academic emotions, academic engagement, needs support, and academic achievement. Because support for the competence and relatedness needs were particularly lacking among those with primarily controlled motives, addressing these needs may be a promising target for educational interventions. More generally, efforts to collect rich information on the perspectives of individuals who inhabit various motivational profiles may both inform our understanding of motivation and direct the application of that knowledge to enhance motivation during the college years.

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