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A Longitudinal Person-Centered Representation of Elementary Students' Motivation: Do Perceptions of Parent and Teacher Achievement Goals Matter?

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Abstract

This study utilized a longitudinal person-centered approach to investigate how children's achievement goals combine with the goals held for them by their parents and teachers to form unique achievement goal profiles among a sample of 619 elementary school students (M_{age} = 9.782, 52.5% female, 79.2% first- and second-generation immigrants) from low SES ethnically diverse neighborhoods. Our results revealed four distinct profiles that proved to be identical from one school year to the next: (a) Low on all Goals, (b) High on all Goals, (c) Mastery-Oriented, and (d) Low Mastery Goals. Students' membership in these profiles was moderate to highly stable over time. Moreover, all profiles were marked by a correspondence between student, parent, and teacher goals, suggesting that elementary students may come to develop a global understanding of the various goal-related messages present in their environment. Higher perceived competence in core academic subjects was associated with membership into profiles characterized by high levels of mastery goals. The Mastery-Oriented profile fared best in terms of academic achievement and anxiety, whereas the Low Mastery Goals profile fared the worst. This Low Mastery Goals profile was unique to our study and represented the largest profile, which could be related to the socioeconomic status of our sample. Our findings provide information regarding the nature and stability of achievement goal profiles among elementary school students and offer new insights into how children interpret goal-related messages in their environment.

Keywords. Achievement Goals; Goal Profiles; Caregiver Goals; Goal Stability; Elementary School; Wellbeing; Achievement

Achievement Goal Theory (AGT) is arguably one of the main theoretical frameworks that researchers use to explain what motivates students' involvement in their academic work (Kaplan & Maehr, 2007). More precisely, AGT describes the various reasons or purposes that drive students' involvement in their schoolwork (i.e., their achievement goals). The present study focused on domain-general approach goals that involve students' drive toward academic success across academic domains (Elliot & Thrash, 2001, 2002, 2010). Compared to avoidance goals that seek to avoid undesired outcomes, approach goals tend to be more practically relevant for children for whom approach and avoidance goals are harder to differentiate (Schwinger et al., 2016). Approach goals center around the notion that students strive to demonstrate (i.e., performance goals) or to develop (i.e., mastery goals) their competence, thus promoting educational attainment and wellbeing (Elliot, 1999; Elliot & McGregor, 2001; Elliot & Murayama, 2008; Nadon et al., 2020).

With some noteworthy exceptions (see Wormington & Linnenbrink-Garcia, 2017, for a review), the bulk of AGT research remains predominantly variable-centered. Variable-centered research focuses on the average associations between variables observed within a specific sample, assumed to generalize to the whole sample, and is thus not well-suited to consider how different types of students might be characterized by qualitatively distinct achievement goal configurations. AGT acknowledges that individual students typically display a combination of goals (Dowson & McInerney, 2003; Pintrich, 2000), with some combinations being more adaptive than the isolated endorsement of a single type of goal (Barron & Harackiewicz, 2001; Senko et al., 2011). In alignment with this perspective, person-centered research explicitly seeks to identify subpopulations (or profiles) of students differing qualitatively and quantitatively from one another in their achievement goal configurations (e.g., Morin et al., 2018). The adoption of a person-centered approach thus provides a more holistic and nuanced perspective on the way achievement goals work in combination, rather than in isolation, to drive students' motivation (e.g., Litalien et al., 2017a, 2017b). Importantly, by focusing on profiles of students, the person-centered approach tends to be more clearly aligned with practitioners' and educators' tendency to think about different "types" of students rather than in terms of complex variable associations (e.g., Morin et al., 2018). As a result, this perspective is well aligned with the development and implementation of targeted and effective motivation-related interventions seeking to maximally nurture, support, and improve the educational and emotional wellbeing of different categories of students (Cauley & McMillan, 2010; DeBacker et al., 2018; Hardre & Reeve, 2003; Morin & Marsh, 2015; Vansteenkiste et al., 2004; Yeager et al., 2016).

Furthermore, rather than being static, achievement goals are dynamic constructs that are likely to evolve over time (Harackiewicz et al., 2002; Pintrich, 2000) as students are exposed to different classrooms and teaching styles from one school year to the other (Dietrich et al., 2015). This evolving nature of achievement goals is particularly important to consider in childhood, a period when school-related beliefs, values, and expectations first emerge as a result of interactions between children and their primary caregivers (i.e., parents and teachers; Anderman et al., 1999; Anderman & Maehr, 1994; Briley et al., 2014; Fredricks & Eccles, 2002; Friedel et al., 2007, 2010; Kaplan & Maehr, 2002, 2007). Indeed, during this period, children come to develop perceptions about what these important adults expect of, and value for them, which in turn contribute to shape their own perceptions (Kahraman & Sungur, 2013; Meece et al., 2003, 2006). The present study was designed to consider the role played by children's achievement goals and their perceptions of the achievement goals held for them by their caregivers via the adoption of a person-centered perspective. More precisely, we first assessed how children's own achievement goals combined with their perceptions of the goals held for them by their parents and teachers to generate qualitatively distinct achievement goal profiles. Second, we systematically assessed the within-sample (i.e., whether the same number of profiles, characterized by the same shape, within-profile variability, and size will be identified over time) and within-person (whether students' membership in specific profiles will change over time) stability of these profiles across 2 consecutive school years. Third, we assessed how membership into these various profiles is influenced by children's beliefs regarding their own academic perceived competence (in French and Math). Fourth, we investigated the impact of profile membership in relation to important academic (i.e., academic achievement) and emotional (i.e., anxiety) outcomes.

Achievement Goal Profiles: Perceptions of Student, Teacher, and Parental Goals

According to Maehr and colleagues' social-cognitive perspective on AGT (Anderman et al., 1999; Anderman & Maehr, 1994; Kaplan & Maehr, 2002, 2007; Maehr & Braskamp, 1986; Maehr &

Pintrich, 1991), children's propensity to move towards positive educational outcomes (i.e., approach achievement goals) is connected to the characteristics of their social environments (i.e., home and school). This perspective has led some to highlight the role that children's *subjective perceptions* of the achievement goals held for them by their teachers and parents may play in influencing their own achievement goals and goal-directed behaviors (Kahraman & Sungur, 2013; Meece et al., 2003, 2006). Additionally, whereas younger students tend to perceive their caregivers' goals (i.e., parents and teachers) as matching their own, these perceptions tend to evolve at the approach of adolescence, leading to more clearly distinct evaluations of these goals (Bardach et al., 2020; Gonida et al., 2009, 2014). Still, goal alignment might be higher between students' personal goals and their perceptions of the goals held for them by their parents, relative to their perceptions of their teachers' goals (Friedel et al., 2007). Finally, although students' own goals are key in fostering their achievement and wellbeing, their perception of their caregivers' goals is also closely related to various educational and emotional outcomes, such as academic achievement and anxiety (e.g., Baudoin & Galand, 2022; Gonida et al., 2009; Wigfield & Cambria, 2010; Zubković & Kolić-Vehovec, 2014). A grey area that remains to be explored is how students combine all three perceptions of achievement goals (i.e., own, parent, and teacher), which would make it possible to identify whether one combination is more optimal than others in supporting student achievement and wellbeing. This was the focus of the present study.

Individual Students' Achievement Goal Profiles

Relatively few studies have relied on a person-centered approach to investigate the most commonly occurring achievement goal configurations among children. This dearth of research limits our understanding of how mastery and performance approach goals might differentially combine among distinct subpopulations of students. In the present study, we focused on domain-general (rather than subject-specific) approach goals, which tend to be far more relevant for children relative to older students (e.g., Sparfeldt & Rost, 2011). Indeed, whereas approach goals initially emerge in an undifferentiated manner across all subjects to reflect children's orientation toward their education in general, these goals become progressively more differentiated across subjects as children grow and develop their specific interests. For instance, studies have found that the correlations between subject-specific mastery goals decreased progressively between Grades 4 and 10 (Józsa et al., 2017). Moreover, motivation and goals related to different subjects are also likely to be more similar for students exposed to a single teacher and teaching style across all subjects, which is common in primary school and was the case for the sample recruited in the present study. In this context, studies conducted among primary school students have generally shown that student goals and motivation in one domain were highly related to their goals and motivation in other domains, when both domains were taught by the same teacher (Dietrich et al., 2015). Lastly, this convergence across subjects is likely to be even greater for students' perceptions of the goals held for them by their teachers (who are teaching them all subjects) and parents (whose goals are more likely to be education-oriented than subject specific in this age group).

Despite their rarity, studies conducted among adolescent populations generally identify between four and six profiles of student achievement goals (Hayenga & Corpus, 2010; Litalien et al., 2017a, 2017b; Shim & Finch, 2014; Tuominen et al., 2020; see Wormington & Linnenbrink-Garcia, 2017, for a review). These studies showed that profiles dominated by mastery goals were among the most common and most adaptive regarding students' well-being, engagement, and achievement. Albeit less frequent, profiles dominated by performance goals tended to be associated with generally maladaptive outcomes. In contrast, profiles characterized by a combination of mastery and performance goals were found to be associated with positive outcomes, suggesting that performance goals might not be as harmful as previously thought (e.g., Elliot, 1999; Elliot & McGregor, 2001) when held alongside mastery goals. Finally, profiles characterized by low or average levels of goals also appeared to be relatively common and were associated with generally maladaptive outcomes.

Person-centered studies of achievement goals conducted specifically amongst elementary school students have generally yielded similar results, although these studies have identified slightly fewer profiles (i.e., between 3 and 5). Consistently, these studies have revealed profiles of students simultaneously endorsing high levels of mastery and performance goals (In De Wal et al., 2016; Hornstra et al., 2017; Schwinger & Wild, 2012; Schwinger et al., 2016; Zhang et al., 2016). Profiles characterized by moderate levels of mastery and performance goals were also commonly identified in these studies (Hornstra et al., 2017; In De Wal et al., 2016; Schwinger et al., 2016; Schwinger & Wild,

2012), whereas a single study identified a profile characterized by low levels of all goals (Schwinger et al., 2016). Finally, whereas several studies found profiles dominated by mastery goals (Schwinger & Wild, 2012; Schwinger et al., 2016; Zhang et al., 2016), fewer studies identified the opposite configuration (Schwinger et al., 2016; Zhang et al., 2016).

Students' Perceptions of their Own, their Teachers, and their Parents Achievement Goals

Children's achievement goals do not occur in a vacuum, but rather tend to be intimately related to the characteristics of their social contexts (e.g., Anderman et al., 1999; Anderman & Maehr, 1994; Briley et al., 2014; Fredricks & Eccles, 2002; Friedel et al., 2007, 2010; Kaplan & Maehr, 2002, 2007; Tynkkynen et al., 2012), including children's perceptions of the goals held for them by their primary caregivers (e.g., Kahraman & Sungur, 2013; Meece et al., 2003, 2006). For instance, Gonida et al. (2014) found that students (Grade 4 and Grade 6) who perceived that their parents emphasized both mastery and performance goals reported more mastery-oriented goals than their peers. Yet, the low-to-moderate correlations reported by Gonida et al. (mastery $M_{|r|}$ = .24; performance $M_{|r|}$ = .07) suggest that the achievement-related messages students receive from their parents only partially influence their own goals, consistent with the presence of other sources of influence. In addition, previous variable-centered studies, predominantly conducted among adolescents, have also revealed that students' perceptions of the goals held for them by their parents and teachers were important determinants of their academic motivation (Vedder-Weiss & Fortus, 2013). For example, students who see their parents and teachers as being mastery-oriented tend to endorse mastery goals more strongly themselves (Gonida et al., 2009). Lastly, in a meta-analysis of 62 studies including samples of elementary, secondary, and tertiary (i.e., college and university) students, Bardach et al. (2020) reported a moderate to high level of correspondence between students' personal goals and their classroom/teacher goal structure (r = .373 to .571). Interestingly, the relation between students' mastery goals and their exposure to mastery classroom goal structures was weakest in elementary (r = .439) and secondary (r = .485) school than in and tertiary (r = 605) education. The authors explained this difference by suggesting that younger students might have more difficulty differentiating between the various goal-related messages present in their environment, leading them to more frequently pursue a combination of mastery and performance goals simultaneously.

Despite the interest of these previous results, no study has yet considered the interplay between students', teachers', and parents' domain-general achievement goals, or the specific profiles taken by the combination of these three sets of goals for different students. Although students' personal goals tend to match their perceptions of their parents and teachers' goals, there also can be a mismatch. For example, Friedel et al. (2007) found that although elementary and middle school students' perceptions of their parent and teacher achievement goals were positively correlated (r =.28 to .40), they still played a distinct role in predicting students' personal goals. Thus, when compared to teachers, parents seemed to play a greater role in predicting children's performance and mastery goals. Adopting a person-centered perspective provides a unique way to address these issues through the identification of profiles of students presenting qualitatively distinct configurations of achievement goals while considering their own goals and their perception of the goals held for them by their parents and teachers. This approach will thus reveal the nature, prevalence, and educational and emotional implications of profiles characterized by matching or divergent achievement goals across the perceived source of the goal (i.e., self, parent, and teacher) and the type of goal (i.e., mastery and performance).

Achievement Goals and Sociocultural Context

Students' own goals as well as their perceptions of their parents' and teachers' goals need to be contextualized within their larger sociocultural background. Studies often investigate student motivation and goals in samples from moderate to high SES backgrounds (Berger & Archer, 2016; Hornstra et al., 2017), which shields our understanding of the equally complex, and yet different, reality of students enrolled in low-SES schools. Studies often describe students from low-SES backgrounds as less likely to endorse approach goals (i.e., mastery and performance) or to report lower global levels of goal endorsement relative to students from higher SES backgrounds (Berger & Archer, 2015, 2016). However, these conclusions do not necessarily represent the multifaceted cultural backgrounds often found in low-SES schools. Indeed, students from immigrant backgrounds (who were born abroad or whose parents were born abroad) are more likely to attend schools situated in low-SES neighborhoods and to face more economic adversity, often despite having highly educated parents (e.g., whose qualifications are not always recognized by the host country; Archambault et al., 2017). This is

particularly the case in countries, such as Canada, where a high number of selected economic immigrants are routinely welcomed. The poverty experienced by these immigrant families is typically the result of having left good employment and financial situations in their home country. For those families, poverty does not entail the same background characteristics commonly seen in the general population living in low SES communities. As a result, several immigrant students attending low-SES schools even outperform non-immigrant students, in addition to reporting higher levels of motivation (Archambault et al., 2017). The goals and aspirations of these students' parents often play a critical role in their schooling trajectory, as immigration is likely considered an instrument to attain a better life (Portes & Rumbaut, 2001). As a result, some students develop a sense of family obligation toward their studies (Urdan et al., 2007), which may lead to a greater tendency to endorse performance goals (Urdan, 2004). Additionally, Kim et al.'s (2020) results suggest that non-immigrant students' perceptions of their teachers' mastery goals are more closely related to their own goals, compared to the goals of students from immigrant backgrounds who often share a stronger association with their perceptions of their parents' mastery goals. Given this complex reality found among students attending low-SES schools, it is important for studies to better understand how students' goals are connected to their perceptions of the goals held for them by their key caregivers.

Achievement Goal Profiles: A Construct Validation Perspective

Although person-centered analyses can be used for both deductive and inductive purposes, they remain methodologically inductive in nature (Morin et al., 2018). It thus is important to document the construct validity of the identified profiles (Marsh et al., 2009; Meyer & Morin, 2016; Morin et al., 2016; Muthén, 2003). In person-centered research, construct validity typically comes from three sources of evidence showing that the identified profiles can be (a) replicated over time or across distinct samples of participants, (b) predicted by theoretically meaningful variables, and (c) differentially related to theoretically relevant outcomes. In the present study, we considered all three sources of evidence.

Replicability Over Time: Effects of Time and Maturation

Tests of replicability, typically referred to as tests of profile similarity, are particularly important in person-centered analyses to discriminate profiles that systematically occur over time and contexts, from profiles that only emerge under specific conditions, and from profiles that infrequently occur because of random sampling variations (e.g., Morin et al., 2016; Solinger et al., 2013). In the present study, we considered the longitudinal similarity of the identified profiles across a time interval of one year. Longitudinal tests of profile similarity make it possible to consider two different sources of stability (or change) in profile solutions (McLarnon et al., 2021; Morin et al., 2016, 2020).

First, within-sample stability refers to whether profiles with the same characteristics (e.g., number, shape, within-profile variability, size) can be identified over time. Examining profile stability is critically important for practical purposes (e.g., Houle et al., 2020; Meyer & Morin, 2016; Spurk et al., 2019). Indeed, the ability to design generalizable interventions based on person-centered solutions is predicated on the identification of a core set of profiles likely to emerge over time and ideally across similar contexts. In the absence of interventions, the nature of the profiles should not change in an unpredictable manner over time as this would indicate that profiles are ephemeral states and unreliable categories. Lacking a core set of profiles would also mean that interventions would need to be designed on a case-by-case basis (e.g., separately for each school grade).

A second form of stability is within-person stability, which refers to whether students' membership into specific profiles remains the same over time and helps to document the most common transitions in profile membership occurring over time. Although some level of within-person stability should be expected to support the value of intervention efforts, this stability should also be limited. Indeed, perfectly stable profile memberships would suggest rigidity, making intervention harder. In contrast, random fluctuations in profile membership over time would suggest that the effects of interventions are unlikely to last.

Person-centered research suggests that, as students get older, their achievement goals tend to become increasingly differentiated, and their endorsement of performance goals tends to increase (e.g., Meece et al., 2003; Schwinger & Wild, 2012; Schwinger et al., 2016). However, person-centered research strictly focused on elementary students' achievement goal profiles suggests a relatively stable within-sample profile structure over time (e.g., Hornstra et al., 2017; In de Wal et al., 2016; Schwinger et al., 2016; Tuominen et al., 2020). Likewise, previous research also reveals a relatively high level of within-person stability in profile membership from one school year to the next (e.g., In de Wal et al.,

2016; Schwinger et al., 2016) and shows that students rarely transition from mastery-oriented profiles toward performance-oriented ones (Schwinger et al., 2016). However, transitions from profiles characterized by high levels of mastery and performance goals to profiles characterized by low or moderate levels of all goals are more common (e.g., In De Wal et al., 2016). Overall, these previous studies thus show that stability tends to decrease as the time interval between the measurement points increases, but that changes in profile structure and profile membership tend to remain limited over a period of one elementary school year. These observations suggest that a 1-year interval might be suitable for tests of profile replicability designed to ensure that the profiles identified in the present study represent reasonably valid and replicable phenomena. Yet, no previous study has simultaneously considered students' own achievement goals together with their perceptions of the goals held for them by their parents and teachers. Although we could expect children's perceptions of their parents' achievement goals to match their own goals instability, children are exposed to different teachers each year. As such, their perceptions of teachers' achievement goals might display a higher level of year-to-year variability, making it important to test whether and how previous results would generalize to this more comprehensive representation of achievement goals.

The Role of Perceived Competence as a Predictor of Profile Membership

In this study, we considered children's perceptions of their academic perceived competence in math and first language (French) as possible predictors of profile membership. Perceived competence, which is the belief that individuals can use their internal resources to overcome challenging tasks and meet specific goals (Connell, 1990; Deci & Ryan, 2000), often has been reported as a critical driver of achievement goals (Cury et al., 2006; Ferla et al., 2010; Law et al., 2012). Contrary to achievement goals that are not yet subject-specific in young students, perceived competence is often defined as subject-specific, and often even as task-specific (Bandura, 1986; Bong, 2002; Jiang et al., 2014; Schunk & Mullen, 2012; Schunk & Pajares, 2009; Usher 2009). However, young students typically do not differentiate between their task-specific competence within more global subjects (i.e., reading versus writing verbal competence) as clearly as older students (e.g., Siefer et al., 2021). Students who feel competent academically are more likely to see school subjects as achievable challenges, making them more likely to persevere in the accomplishment of all tasks associated with those subjects (Cury et al., 2006; Duchesne & Larose, 2018; Schunk, 2003; Schunk & DiBenedetto, 2016, 2020). As a result, perceived competence helps to nurture students' adoption of mastery and performance goals (Duchesne & Larose, 2018; Elliot & Church, 1997; Greene et al., 2004).

Previous person-centered studies have shown that students who report high levels of perceived competence are more likely to correspond to profiles characterized by moderate to high levels of mastery goals (Fortunato & Goldblatt, 2006; Wormington & Linnenbrink-Garcia, 2017) or by high levels of mastery and performance goals (Luo et al., 2011; Wormington & Linnenbrink-Garcia, 2017). Moreover, and consistent with self-consistency theory (Swann, 1983), students' perceived competence might lead them to perceive their parents' and teachers' expectations in a way that confirms their own beliefs. Thus, students who feel competent could potentially perceive their parents and teachers as holding similarly high mastery and performance goals for them. This possibility has, however, never been considered in research as previous studies have mainly focused on how parents' and teachers' goals influence student perceived competence, rather than the other way around (Bandura, 1986; Friedel et al., 2007, 2010; Jiang et al., 2014; Schunk & Mullen, 2012; Usher, 2009). The present study was specifically designed to address this possibility.

The Implications of the Profiles for Students' Academic Achievement and Anxiety

In this study, we considered students' academic achievement and anxiety as outcomes of profile membership. Students who are motivated by a desire to learn and grow (i.e., mastery goals) consistently fare best with academic and socioemotional outcomes (Hornstra et al., 2017; Pahljina-Reinić & Kolić-Vehovec, 2017; Schwinger et al., 2016). Academic achievement represents students' learning, mastery, and performance in school subjects, generally based on grades or teachers' normative assessments (York et al., 2015). Although school-specific anxiety is commonly studied in relation to academic achievement goals (e.g., Huang, 2011), it is also important to understand how achievement-related factors influence anxiety more generally. Anxiety, defined as "an emotion characterized by feelings of tension, worried thoughts and physical changes like increased blood pressure" (American Psychological Association, 2021), is one of the most common psychological health problems in childhood and adolescence (Kessler et al., 2005; Polanczyk et al., 2015). Left undetected and untreated, anxiety can

have long term effects on development and functioning (Bittner et al., 2007; Broeren et al., 2013; Kessler et al., 2005; Polanczyk et al., 2015).

Students' achievement goals, anxiety, and achievement are inter-connected. Whereas performance goals can sometimes contribute to academic success (Butler, 2006; Kesici & Erdogan, 2010; Harackiewicz et al., 2008; Midgley et al., 2001; Mouratidis et al., 2018; Muyarama & Elliot, 2012; Skaalvik, 2018; Tanaka et al., 2006; Van Yperen et al., 2014; Wirthwein et al., 2013), they can also come at a cost for mental health outcomes, like anxiety, by eliciting social comparison processes and self-doubt (Goetz et al., 2016; Huang, 2011; Linnenbrink, 2005; Luo et al., 2011; Pahljina-Reinić & Kolić-Vehovec 2017; Pekrun et al., 2006). Students pursuing mastery goals, however, tend to report generally more adaptive outcomes such as higher academic achievement and lower anxiety (Hornstra et al., 2017; Huang, 2011, 2012; Pahljina-Reinić & Kolić-Vehovec, 2017; Schwinger et al., 2016; Van Yperen et al., 2014, 2015). Similar findings also seem to apply to perceptions of goals held by parents and teachers. Thus, when students perceive that their teachers and parents emphasize mastery goals, they tend to feel less anxious, to employ better learning strategies, and to achieve higher grades (Baudoin & Galand, 2022; Gonida et al., 2009; Wigfield & Cambria, 2010; Zubković & Kolić-Vehovec, 2014). However, research results are equivocal regarding teachers' and parents' performance goals. Some studies suggest that students tend to exhibit less adaptive learning processes when they perceive that their teacher focuses on social comparisons (a component of classroom performance goal structures; Elliot & Church, 1997; Skaalvik, 1997). Likewise, limited information is available regarding the effects of discrepancies between personal goals and perceived parent and teacher achievement goals. One possibility that has not yet been empirically evaluated is that misalignment could create a cognitive goal conflict (Festinger, 1957; Harmon-Jones, 2019) whereby students feeling exposed to discrepant messages from their environments may come to experience higher levels of anxiety.

Person-centered studies suggest that mastery-oriented students, and students endorsing both mastery and performance approach goals, tend to experience the most adaptive outcomes. However, performance goals only seem adaptive when combined with mastery goals (Hornstra et al., 2017; Schwinger et al., 2016; Zhang et al., 2016), and the adaptiveness of this combination may depend on the outcome of interest (Schwinger & Wild, 2012). In terms of anxiety, profiles characterized by high levels of mastery goals consistently seem to experience the lowest levels of anxiety (Liu et al., 2020; Jang & Liu, 2012). Additionally, profiles characterized by low levels of mastery and performance goals tend to experience lower levels of anxiety than profiles characterized by low or moderate levels of goals (Liu et al., 2020; Jang & Liu, 2012). Taken together, these studies thus suggest that performance goals can be adaptive for academic achievement when held alongside mastery goals, but that high mastery goals alone are likely to result in the most adaptive outcomes.

The Present Study

The present study first investigated how students' own domain-general approach achievement goals combine with their perceptions of the goals held for them by their parents and teachers among a sample of elementary school students from low-SES backgrounds. Based on previous person-centered research conducted among elementary school students (In De Wal et al., 2016; Hornstra et al., 2017; Schwinger & Wild, 2012; Schwinger et al., 2016; Zhang et al., 2016) we expected to identify between 3 and 5 profiles (Hypothesis 1). We also expected some of these profiles to match one or more of the following configurations (Hypothesis 2): (a) high mastery and performance goals (i.e., high on all goals); (b) low or moderate mastery and performance goals (i.e., low or moderate on all goals); (c) high mastery goals, combined with low to moderate performance goals (i.e., mastery-oriented); (d) high performance goals, combined with low to moderate mastery goals (i.e., performance-oriented); and (e) at least one profile marked by discrepancies between perceived student, parent, and/or teacher goals. Consistent with research suggesting that parents play a larger role than teachers in predicting students' goals (Friedel et al., 2007), especially among students from an immigrant background (Kim et al., 2020), we anticipated that such discrepancies would be more likely to emerge between students' own and perceived teacher goals, compared to between students' own and perceived parents' goals.

Our second objective was to document the within-sample and within-person stability of the achievement goal profiles over a 1-year interval taken across 2 consecutive school years. We expected to extract the same number of profiles, characterized by the same shape, within-profile variability, and size across timepoints (i.e., within-sample stability; Hypothesis 3). Based on the age of our sample and the 1-year gap between timepoints, we also expected most profiles to display moderate (50%+) to high

(75%+) levels of within-person stability over time (Hypothesis 4).

Our third objective was to assess how perceived competence in core academic subjects of math and French (first language) would be associated with profile membership. We expected that students who reported high levels of perceived competence in both subjects would more likely correspond to a mastery-oriented or high on all goals profile, rather than to other profiles (Hypothesis 5).

Our last objective was to investigate associations between profile membership, achievement, and anxiety. We expected the mastery-oriented profile to display the highest levels of academic achievement and the lowest levels of anxiety, followed by the high on all goals profile, then by the low on all goals and performance-oriented profiles (Hypothesis 6). We left open the research question of whether and how profile(s) marked by goal discrepancies might be associated with these outcomes.

Method

Participants and Procedures

This study relied on a sample of 619 elementary school students (52.5% female; age range = 7–12 years, M_{age} = 9.782, SD_{age} = 1.052) who completed questionnaires in the spring of two consecutive school years. Participants were enrolled in Grade 3 (n = 208), Grade 4 (n = 177), and Grade 5 (n = 189) in five French-speaking primary schools located in ethnically diverse neighborhoods with low socioeconomic status in the city of Montreal (Québec, Canada). Of these participants, 153 completed a single time point (54.2% females; M_{age} = 9.790 years), whereas 466 (51.9% females; M_{age} = 7.780 years) completed both time points.

This sample was mainly composed of first- (38.4%) and second- (40.8%) generation immigrants. For first- or second-generation immigrant students, the main countries of origin were Haiti (34.0%), Algeria (18.8%), Morocco (11.0%), or others (15.4%; e.g., Cameroon, El Salvador, France, Guatemala, Ivory Coast, Peru, Tunisia, U.S.A, Vietnam). Among participating families, about 45% had a mean annual income lower than $30,000 (CAD), which is under the low-income threshold in Québec. Among the remaining families, roughly 30% reported a mean annual income between $30,000 and $49,999 (CAD) per year, 16% reported a mean annual income between $50,000 and $79,999 (CAD) per year, and 9% reported a mean annual income over $80,000 (CAD) per year. At the school level, parents of students enlisted in four of the five participating schools reported an average annual income between the response categories of less than $30,000 (CAD) and $30,000–$49,999 (CAD). Parents of one school reported a mean income ranging between $50,000 and $79,999 (CAD).

Data collection was approved by the research ethics committee of the third author's institution, as well as by the school board of the participating schools. Active parental consent was obtained for all students, who also consented to their own participation. The participation rate of students was slightly above 70%. Given the large proportion of participating students whose language spoken at home was other than French, consent forms were translated into the five most common languages spoken at home (i.e., English, Spanish, Creole, Turkish, and Arabic) to facilitate parental understanding. At each time point, students completed a computerized questionnaire in their classroom. Two trained research assistants supervised the data collection while teachers answered a questionnaire in a separate room. Research assistants read the questions aloud and, when necessary, answered students' questions to ensure their understanding. The questionnaire took a maximum of 1 hr to answer.

Teachers provided their own informed consent to participate to the study, with a participation rate of 100%. In the Quebec school system, primary teachers teach all subjects (e.g., math, language, science). The 56 (in Year 1, including 90.6% females) and 53 (in Year 2, including 89.6% females) teachers involved with these students were asked to report on the academic achievement of all students. Over 50% of participating teachers had at least 10 years of teaching experience (54.7% at T1 and 60.4% at T2) and over 90% of them were born in Canada (90.4% at T1 and 92.2% at T2).

Measures

Achievement Goals

The French adaptation (Duchesne et al., 2012) of the Patterns of Adaptive Learning Scales (Midgley et al., 2000) was used to assess domain-general achievement goals at both measurement points. At both time points, students completed a total of 33 items reflecting their own achievement goals, as well as their perceptions of the achievement goals that their parents and teachers held for them using a scale ranging from 1 (*almost never*) to 5 (*almost always*). For self-reported achievement goals, students responded to five items measuring mastery goals (e.g., "It is important to me to learn new things this year"; Time 1 α = .825, Time 2 α = .861) and five items measuring performance goals (e.g.,

"It's important for me to appear intelligent compared to my classmates"; Time 1 α = .922, Time 2 α = .937). In relation to perceptions of their parents' goals, students completed six items measuring mastery goals (e.g., "My parents want me to understand the work I do in class, not just memorize how to do it"; Time 1 α = .678, Time 2 α = .690) and five items measuring performance goals (e.g., "My parents want me to demonstrate that I'm better at school than the other students in my class"; Time 1 α = .814, Time 2 α = .825). In relation to perceptions of their teacher's goals, students completed three mastery items (e.g., "My teacher thinks that it's okay to make mistakes, as long as we are learning"; Time 1 α = .606, Time 2 α = .606) and three performance items (e.g., "My teacher tells us where we rank compared to the other students in the class"; Time 1 α = .720, Time 2 α = .734).

Perceived Competence

Students' perceptions of their own academic perceived competence in math (e.g., I have difficulty in math; Time 1 α = .759, Time 2 α = .837) and French were assessed at both time points using six items (e.g., I find that I am good at French; Time 1 α = 750, Time 2 α = .784) taken from the New Approaches New Solutions originally developed in French (Janosz et al., 2010). These items were rated using a 5-point scale ranging from 1 (*almost never*) to 5 (*almost always*).

Anxiety

Students' manifestations of anxiety were assessed at both measurement points using all 28 items of the French adaptation (Turgeon & Chartrand, 2003) of the Revised Children's Anxiety Manifest Scale (RCAMS; Reynolds & Richmond, 1978). This instrument includes 12 items covering manifestations of worry/hypersensitivity (e.g., "I worry most of the time"; Time 1 α = .838, Time 2 α = .855), eight items covering physiological symptoms (e.g., "I am often tired"; Time 1 α = .695, Time 2 α = .695), and eight items covering social concerns and concentration difficulties (e.g., "Other children are happier than me" or "I have trouble concentrating on my school work"; Time 1 α = .754, Time 2 α = .787), which can be combined into a total score (Time 1 α = .901, Time 2 α = .910). Participants indicated whether these symptoms generally applied to them using a binary (*yes/no*) response format. We relied on a bifactor operationalization (e.g., Morin et al., 2020) that allowed us to obtain a global anxiety factor estimated from all items for our analyses while accounting for the specificity associated with each subscale (see Supplementary Materials).

Academic Achievement

At both time points, teachers ranked each of their student's academic achievement compared to other students in the classroom, which represents a normative assessment of their achievement. More precisely, they completed one item each related to children's performance in math, reading, and writing (e.g., "Since the beginning of the school year, how would you evaluate this students' average math performance compared to the other children in your class?"; Time 1 α = .905, Time 2 α = .890) using a 5-point scale ranging from 1 (*well below average*) to 5 (*well above average*). In the Canadian province of Québec, primary school students are taught all subjects by the same teacher who is responsible for grading all assignments, tests, and exams. Teachers are thus the primary source of information in relation to primary school students' achievement (Ministère de l'Éducation du Québec, 2002, 2003). Our measure of achievement is also highly correlated with students' official school records (Duncan et al., 2007; Pagani et al., 2001). In addition, this measure was found to remain stable from year to year (i.e., when achievement is assessed by different teachers) and associated with relevant motivational outcomes (i.e., student engagement and perceived competence) both concomitantly and longitudinally (Olivier et al., 2019).

Analyses

Preliminary Analyses

Preliminary Confirmatory Factor Analyses (CFAs) were conducted to verify the measurement properties and invariance (i.e., equivalence; Millsap, 2011) over time of all variables used in the present study. These analyses are reported in the first section of the Supplementary Materials and support the adequacy, measurement invariance, and composite reliability of our main factors: (a) teachers' mastery goals (ω = .747), (b) teachers' performance goals (ω = .796), (c) students' mastery goals (ω = .920), (d) students' performance goals (ω = .957), (e) parents' mastery goals (ω = .867), (f) parents' performance goals (ω = .814), (g) math perceived competence (ω = .865), (h) French perceived competence (ω = .832), (i) academic achievement (ω = .924), and (j) global anxiety (ω = .956). Time-invariant factor scores, estimated in standardized units with a mean of 0 and a variance of 1, were saved from these analyses and used in the main analyses. Factor scores have the advantage of affording a partial

correction for measurement errors (Skrondal & Laake, 2001) and preserve the measurement structure (e.g., invariance, bifactor) of the measurement model (Morin et al., 2016).

Latent Profile Analyses

All analyses were conducted in *Mplus* 8.4 (Muthén & Muthén, 2019). Latent Profile Analyses (LPA) were estimated using the Maximum Likelihood Robust estimator (MLR) and Full Information Maximum Likelihood (FIML; Enders, 2010; Graham, 2009) procedures to retain all participants who completed at least one measurement point (n = 619) rather than to inappropriately eliminate (i.e., listwise deletion) those who only participated once (n = 153). All models were estimated using 6000 randomly generated sets of start values each allowed 1000 iterations. The best 500 and 100 of them were, respectively, retained for the second and final rounds of optimization (Hipp & Bauer, 2006; McLachlan & Peel, 2000).

To identify student achievement goal profiles, LPA including 1–8 profiles were first estimated separately at each time point using the achievement goal factor scores from our preliminary analyses. In these solutions, the means and the variances of the profile indicators were freely estimated across profiles. To select the optimal time-specific solution, we considered the meaning, theoretical conformity, and statistical adequacy of each solution (Marsh et al., 2009; Morin & Litalien, 2019), as well as various statistical indices. Thus, a lower value on the Akaïke Information Criterion (AIC), the consistent AIC (CAIC), the Bayesian Information Criterion (BIC), or on the sample-size Adjusted BIC (ABIC) are indicative of a better fitting model. Likewise, a statistically significant p-value on the adjusted Lo, Mendel, and Rubin's (2001) Likelihood Ratio Test (aLMR) or on the Bootstrap Likelihood Ratio Test (BLRT) support the value of an LPA solution relative to a solution including one less profile. Statistical simulation studies have demonstrated that the CAIC, BIC, ABIC, and BLRT are reliable indicators of the optimal number of profiles, but not that of the AIC and ALMR, which are thus only reported for purposes of transparency (e.g., Diallo et al., 2016, 2017; Morin & Litalien, 2019). However, because these indicators are all sample-size dependent, they often fail to converge on a specific solution (Marsh et al., 2009). When this happens, it is recommended to display the value of the information criterion as a function of the number of profiles (i.e., an elbow plot). In these displays, the optimal solution is suggested by the point at which the decrease in the value of these indicators reaches an inflection point (Morin & Litalien, 2019; Morin et al., 2011). Finally, although this indicator should not be used to guide the selection of the optimal solution, we also report the model entropy. This indicator varies from 0 to 1, with higher values indicating a higher accuracy in the classification of students into the various profiles.

Tests of Profile Similarity and Latent Transition Analyses

Considering that the LPA retained at each time point included the same number of profiles, both time-specific solutions were combined into a single longitudinal LPA of configural similarity. From this model, following sequential procedures described by Morin et al. (2016) and adapted to the longitudinal context by Morin and Litalien (2017), we tested the within-sample structural (whether the profiles retain the same shape), dispersion (whether the within-profile variability remains the same), and distributional (whether the profile sizes remain the same) similarity of the profiles over time. Morin et al. (2016) noted that similarity is supported when at least two out of the CAIC, BIC, and ABIC indices are lower in a model relative to the previous one in the sequence. The most similar model was converted to a Latent Transition Analysis (LTA) model (Collins & Lanza, 2010) to assess within-person stability in profile membership over time (i.e., stability and change in profile membership; Kam et al., 2016). This conversion was done using the manual three-step approach described by Morin and Litalien (2017) to ensure that the profiles remained unchanged.

Demographic Controls and Predictors

Student's demographic characteristics (measured at Time 1) and the predictors (measured at Time 1 and Time 2) were then included in the LTA using a multinomial logistic regression to assess their role in predicting students' likelihood of membership into the various profiles. To verify the need to include these variables in our main analyses, these analyses were first realized using only the demographic variables, including students' sex (coded 0 for boys, 1 for girls), grade level (ranging from 3 to 6), and immigration status (coded 0 for third generation immigrants or higher, 1 for first and second generation immigrants). Four alternative models were contrasted. In the first model, we allowed the relation between these variables and likelihood of profile membership to vary over time, and as a function of students' membership into the Time 1 profiles in the prediction of their membership into

the Time 2 profiles. Doing so allowed us to test whether demographic variables had a direct influence on specific profile transitions (i.e., transitioning from one profile at Time 1 to a different profile at Time 2). In the second model, these predictions were only allowed to differ over time. In the third model, these predictions were constrained to be equivalent over time, corresponding to a model of predictive similarity (Morin et al., 2016). A final model (i.e., null effects) constrained these predictions to be exactly 0, consistent with a complete lack of effects of the demographic variables. The same sequence of models was then repeated with the theoretical predictors (i.e., math and French perceived competence), with or without the demographic controls based on the previous results.

Outcomes

Outcomes (i.e., anxiety and achievement at Time 1 and Time 2) were directly incorporated in the final LTA solution and associated with profile membership at the matching timepoint (i.e., profiles at Time 1 associated with outcomes at Time 1). As recommended by Morin et al. (2016), two alternative models were contrasted in which outcome levels were allowed to differ across profiles and time points, or only across profiles (corresponding to a model of explanatory similarity). Mean differences in outcome levels across profiles were tested in a single step using the multivariate delta method (Raykov & Marcoulides, 2004), implemented in Mplus via the MODEL CONSTRAINT function. The global theoretical model tested in the present study is summarized in Figure 1.

Results

Latent Profiles Analyses

The results of the alternative time-specific LPA are reported in the top sections of Table 1, and graphically presented in Figures S1 and S2 of the Supplementary Materials. At both time points, the CAIC, BIC, ABIC, and BLRT suggested the addition of profiles without converging on any specific solution. The elbow plots seemed to suggest a slight inflection point in the decrease of the information criteria associated with the four-profile solution. For this reason, we more carefully inspected solutions including 3–5 profiles. This inspection first revealed a high level of similarity in the nature of the estimated profiles across time points, thus providing preliminary evidence of configural similarity. Furthermore, these results revealed that adding a fourth profile to the solution resulted in the estimation of a meaningfully distinct profile with regards to shape (corresponding roughly to Profile 4 in Figure 2). However, adding a fifth profile only resulted in the arbitrary division of one of the existing profiles (corresponding roughly to Profile 2 in Figure 2) into smaller similarly shaped profiles, differing only in their level of achievement goals. Therefore, and supporting Hypothesis 1, the four-profile solution was retained at both time points, consistent with its configural similarity.

Longitudinal Tests of Profile Similarity

The results from the longitudinal tests of profile similarity conducted on this four-profile solution are reported in the middle section of Table 1. These results support the structural (lower CAIC and BIC relative to the configural similarity model), dispersion (lower CAIC, BIC, and ABIC relative to the structural similarity model), and distributional (lower CAIC and BIC relative to the dispersion similarity model) similarity of this solution. These results indicate that the number, nature, within-profile variability, and size of the profiles remains unchanged over time, supporting Hypothesis 3.

Profile Description

This final model of distributional similarity is represented in Figure 2 and the detailed parameter estimates from this solution are reported in Table S6 of the Supplementary Materials. First, there was a high level of correspondence between perceived goal sources, such that no profiles were marked by discrepancies between students' and perceived parents' and teachers' goals. Next, both Profile 1 and Profile 2 corresponded to roughly one fifth of the sample (18% for Profile 1 and 19% for Profile 2). However, whereas Profile 1 was characterized by low levels of all goals (i.e., Low on all Goals), Profile 2 was characterized by high levels of all goals (i.e., High on all Goals). Profile 3, corresponding roughly to a fourth of the sample (23%), had a more differentiated shape characterized by high levels of mastery goals and low levels of performance goals across all perceived sources (i.e., self, parents, and teachers). This profile was termed *Mastery-Oriented*. Profile 4 was the largest, corresponding to 40% of the sample. Contrasting with Profile 3, Profile 4 was characterized by average levels of performance goals and low levels of mastery goal across all perceived sources and was labeled *Low Mastery Goals*. This solution was associated with a relatively high level of classification accuracy of students into their most likely profile as indicated by an entropy value of .828. These results partially support Hypothesis 2. Specifically, Profiles 1, 2, and 3 aligned with our predictions, whereas Profile 4 (i.e., Low Mastery

Goals) was not expected. Additionally, the lack of profiles characterized by discrepancies between student and perceived parents' or teachers' goals was unexpected.

Latent Transition Analysis

The final model of distributional similarity was converted to an LTA. The transition probabilities (i.e., within-person stability and change) from this model are reported in Table 2. Membership into all profiles was moderately to highly stable over time (probabilities of remaining in the same profile ranging from 58.7% to 79.4%), thus supporting Hypothesis 4. Students corresponding to Profile 1 (i.e., Low on all Goals) at Time 1 had a 77.1% probability of remaining in the same profile at Time 2. For students corresponding to Profile 1 who transitioned to another profile, 12.7% transitioned to Profile 3 (i.e., Mastery-Oriented) and 10.4% transitioned to Profile 4 (i.e., Low Mastery Goals), but none of them transitioned to Profile 2 (i.e., High on all Goals). Profile 2 (i.e., High on all Goals) was the least stable, with 58.7% of the students corresponding to this profile remaining in the same profile at Time 2. For this profile, the most likely transitions were toward Profiles 4 (Low Mastery Goals; 23.2%) or 3 (Mastery-Oriented; 16.2%), with only 2% of students initially corresponding to this profile transitioning to Profile 1 (i.e., Low on all Goals) over time. Profile 3 (i.e., Mastery-Oriented) demonstrated a high stability (78.8%), with the most likely transitions involving Profile 1 (i.e., Low on all Goals; 13.0%) and fewer transitions toward Profile 2 (i.e., High on all Goals; 3.4%) and Profile 4 (i.e., Low Mastery Goals; 4.7%). Finally, Profile 4 (i.e., Low Mastery Goals) demonstrated the highest stability (79.4%) but involved transitions toward all other profiles, including Profile 1 (i.e., Low on all Goals; 9.8%), Profile 3 (i.e., Mastery-Oriented; 7.4%), and Profile 2 (i.e., High on all Goals; 3.5%). Overall, these results suggest that between school years, students' pattern of goal endorsement remains quite stable. However, students characterized by a high and undifferentiated level of goal endorsement appeared to be the most likely to transition to another profile by the end of the subsequent school year.

Predictors of Profile Membership

The results related to the alternative predictive models are reported in the third (demographic variables) and second (perceived competence) to last sections of Table 1. These results first indicate that the demographic variables shared no association with students' likelihood of profile membership (i.e., the null effects model resulted in the lowest values on the CAIC, BIC, and ABIC). Therefore, these variables were not included in further analyses. In contrast, our theoretical predictors (i.e., Math and French perceived competence) were associated with students' likelihood of profile membership in a way that was similar over time and profiles (i.e., the model of predictive similarity resulted in the lowest values on the CAIC, BIC, and ABIC). This model was thus retained for interpretation. The results from this model are reported in Table 3. These results indicate that students with higher Math and French perceived competence had a higher likelihood of belonging to Profiles 2 (i.e., High on all Goals) or 3 (i.e., Mastery-Oriented) relative to Profile 4 (i.e., Low Mastery Goals). Additionally, students reporting higher levels of Math perceived competence also had a higher likelihood of membership into Profile 2 (i.e., High on all Goals) and Profile 3 (i.e., Mastery-Oriented) relative to Profile 1 (i.e., Low on all Goals). These results support Hypothesis 5.

Outcomes of Profile Membership

The results related to the alternative outcome models are reported in the last section of Table 1. These results support the model of explanatory similarity (which resulted in the lowest values on the CAIC, BIC, and ABIC), consistent with outcome associations that are stable over time. The results from this model are reported in Table 4 and graphically illustrated in Figure 3. These results indicate that students corresponding to Profile 3 (*Mastery-Oriented*) displayed higher levels of academic achievement relative to students corresponding to all other profiles, who did not differ from one another in this regard. Students corresponding to Profiles 1 (*Low on all Goals*) and 3 (*Mastery-Oriented*) reported lower global levels of anxiety than those corresponding to Profiles 2 (*High on all Goals*) and 4 (*Low Mastery Goals*), although these levels did not differ between Profiles 1 (*Low on all Goals*) and 2 (*High on all Goals*). These results largely support Hypothesis 6.[1]

[1] To test whether profile membership could predict changes in outcomes over time, the longitudinally invariant preliminary measurement models used to estimate factor scores for the outcomes were converted to a latent change model, allowing us to explicitly model changes in outcome levels over time. Profiles were then compared to one another in relation to these changes. These additional results, available upon request from the authors, were

Discussion

Children's achievement goals emerge over time through interactions with their primary caregivers (e.g., Friedel et al., 2007, 2010; Kaplan & Maehr, 2002, 2007; Maehr & Braskamp, 1986; Maehr & Pintrich, 1991). In particular, children's own domain-general approach goals are influenced by their *perceptions* of the goals held *for them* by their caregivers (Kahraman & Sungur, 2013; Meece et al., 2003, 2006). Despite the recognition that caregiver goals matter, this study is the first to test the nature of elementary students' achievement goal profiles while simultaneously accounting for their own goals and their perceptions of the goals held *for them* by their parents and teachers. Furthermore, our study provides evidence of longitudinal within-sample and within-person stability of these achievement goal profiles, thereby supporting their robustness and highlighting their suitability as potential guides for intervention. Lastly, by showing that children's perceived competence predicted their profile membership, which in turn predicted their levels of achievement and anxiety, this study lends support for the construct validity of our profiles and offers avenues for intervention.

Profiles Combining Students' Perceptions of Own, their Parents, and their Teachers Achievement Goals

Our results revealed four distinct achievement goal profiles that partially matched our expectations, as expressed in Hypotheses 1 and 2. More precisely, the High on all Goals profile and the Mastery-Oriented profile both align with profiles consistently found in previous studies of elementary students (Hornstra et al., 2017; In De Wal et al., 2016; Schwinger & Wild 2012; Schwinger et al., 2016; Zhang et al., 2016). Likewise, although we did not anticipate a Low on all Goals profile this early in students' educational trajectories, this study is not the first to identify a similar profile among elementary students (i.e., Schwinger et al., 2016). The proportion of students corresponding to this profile in our sample (18%) was more important than the 2%–4% found in other studies of elementary students (Schwinger et al., 2016) or older students (Wormington & Linnenbrink-Garcia, 2017). The Low Mastery Goals profile (i.e., low levels of mastery goals and average levels of performance goals) comprising 40% of students was also surprising, especially given that a single study had identified a similar profile with 27% of its sample (Zhang et al., 2016). The fact that our sample included a majority of first and second-generation immigrants from low SES backgrounds, whereas most previous studies focused on students from higher SES backgrounds, could possibly explain these findings. Typically, studies describe students from low-SES backgrounds as less likely to endorse approach goals (i.e., mastery and performance) or to report lower overall levels of goal endorsement relative to higher SES students (Berger & Archer, 2015, 2016), which shares similarities with the Low on all Goals profile. However, it is important to acknowledge the complex reality of low SES schools. Notably, students from immigrant backgrounds are more likely to attend schools in low SES neighborhoods, even if their parents are often highly educated (Archambault et al., 2017). Immigration is often seen by parents as a vehicle for building a better future for their children (Portes & Rumbaut, 2001), leading some students to have a stronger desire to succeed as a way to please their family (i.e., performance goals; Urdan et al., 2007), which could explain that 40% of our participants corresponded to the Low Mastery Goals profile.[2]

Unexpectedly, our results did not reveal any profiles marked by discrepancies between student perceptions of their own, their parents', and their teachers' achievement goals. Rather, all four profiles reflected a strong degree of alignment between students' personal goals and their perceptions of the goals held for them by their parents and teachers. Previous variable-centered studies revealed moderate

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consistent with a lack of impact of profile membership on changes in outcome levels. Our results are thus consistent with the presence of time-specific profiles-to-outcomes associations.

[2] Based on reviewers' suggestions, we conducted additional analyses to contrast the SES levels and immigration backgrounds of students corresponding to the different profiles. These analyses revealed a single difference in SES at T2, suggesting that students corresponding to the Low Mastery Goals profile had a slightly lower SES than those corresponding to the Low on All Goals profile. In terms of immigration background, our results showed that first-generation immigrant students (relative to second- or third-plus generation students), were less likely to correspond to the Low on All Goals profile at T1 than to the three other profiles (i.e., High on All Goals, Mastery-Oriented, and Low Mastery Goals). These results further reinforce that, even when sharing low SES, students from more recent immigrant backgrounds tend to be slightly more driven toward achievement than their peers. This also applies to the Low Mastery Goals profile, in which first-generation students perceived that parents and teachers value a slightly above-average level of performance goals.

to high levels of correspondence between personal, teacher, and parental goals (e.g., Bardach et al., 2020; Gonida et al., 2014, 2009), which is consistent with our results. Conversely, research has also shown that parents seem to play a larger role than teachers in predicting students' goals (Friedel et al., 2007), particularly amongst immigrant students (Kim et al., 2020).

One possible explanation for this high level of goal alignment is that younger students may struggle to differentiate between the various goal-related messages in their environments (Bardach et al., 2020). Indeed, individuals develop their ability to properly perceive and differentiate various social perspectives throughout childhood and into adolescence (e.g., Burnett et al., 2011; Symeonidou et al., 2016; Tamnes et al., 2018). From a developmental perspective, it is thus possible that the elementary student participants in our study could simply not imagine their parents' and teachers' achievement goals differing from their own (Stipek & Iver, 1989). This aligns with the striving for self-consistency that characterizes every human being (Swann, 1983), coupled with normative attempts to avoid cognitive goal conflicts (Festinger, 1957; Harmon-Jones, 2019). In any case, the high level of goal alignment that we found points to an interesting avenue for future researchers to more thoroughly examine the mechanisms involved in this convergence of goals (i.e., striving for cognitive consistency vs true influence of the caregivers).

Replicability Over Time

Consistent with Hypothesis 3, our results confirmed the robustness of these profiles by supporting their within-sample stability over a 1 year interval. More precisely, we identified the same number of profiles, characterized by the same shape and within-profile variability, and corresponding to the same proportion of our participant group, at both time points. This observation confirms that our profiles were unlikely to reflect random sampling variations or to reflect ephemeral phenomena (Morin et al., 2016; Spurk et al., 2019).

Consistent with Hypothesis 4, our results revealed moderate to high levels of within-person stability (58.7%–79.4%), suggesting that profile membership was not highly likely to change on its own, while remaining flexible enough to make change possible. In combination, these two observations further reinforce the possible utility of our results as a guide for intervention. More concerning was the fact that the Low Mastery Goals profile was not only the largest (40% of sample), but also the most stable (79.4%). Moreover, when students transitioned out of this profile, it was often toward the Low on all Goals profile (9.8%), suggesting a clear need for intervention designed to help students move away from this problematic profile. Fortunately, some students also transitioned from this profile to the more desirable Mastery-Oriented (7.4%) or High on all Goals (3.5%) profiles, suggesting that improvement is possible.

Unfortunately, the High on all Goals profile was the least stable (58.7%). Many students who transitioned out of this profile over time did so in favor of the Low Mastery Goal (23.2%) profile, whereas others transitioned toward the most adaptive Mastery-Oriented (16.2%) profile. These results suggest that it might be hard to jointly sustain high levels of mastery and performance goals over time, and that efforts should be made to help students presenting with this achievement goal configuration to prioritize mastery, rather than performance, goals over time. These observations correspond with previous research suggesting that as students get older their goals tend to become more differentiated (Meece et al., 2003; Schwinger & Wild, 2012; Schwinger et al., 2016).

Lastly, our results align with previous studies demonstrating that students rarely transition from mastery- toward performance-oriented profiles (Schwinger et al., 2016), but are more likely to transition toward profiles characterized by low or moderate levels of all goals (In De Wal et al., 2016). Indeed, for students initially corresponding to the Mastery-Oriented profile (with a stability of 78.8%), the most likely transition involved the Low on all Goals profile (13.0%). Interestingly, the opposite type of transition seemed equally likely, as 12.7% of the students initially corresponding to the Low on all Goals profile (with a stability of 77.1%) transitioned toward a Mastery-Oriented profile over time. However, some of them also transitioned toward the Low Mastery Goals profile (10.2%). These results suggest that even if mastery-oriented students are highly likely to retain this profile over time, they may not be immune to losing their academic drive and may also benefit from intervention. Alternatively, these results also suggest that even students who appear to completely lack a drive to achieve could improve if supported in the right manner.

Perceived Competence and Achievement Goal Profiles

Consistent with Hypothesis 5, our results supported the idea that students who felt more

competent in math and French (i.e., main language) were more likely to belong to profiles characterized by high rather than low levels of mastery goals (i.e., High on all Goals or Mastery-Oriented vs. Low Mastery Goals). This result is consistent with AGT (Cury et al., 2006; Duchesne & Larose, 2018; Elliot & Church, 1997; Greene et al., 2004; Schunk, 2003; Schunk & DiBenedetto, 2016, 2020) and with empirical person-centered results (Fortunato & Goldblatt, 2006; Luo et al., 2011; Wormington & Linnenbrink-Garcia, 2017), suggesting that students who feel more competent academically are more likely to adopt mastery goals, and to a lesser extent performance goals, as a result of viewing school tasks as achievable challenges that they wish to master.

Furthermore, and consistent with the fact that students' perceptions of their own academic perceived competence vary across domains (Bandura, 1986; Bong, 2002; Jiang et al., 2014; Schunk & Mullen, 2012; Schunk & Pajares, 2009; Usher 2009), we found additional associations that were limited to students' perception of math perceived competence. Students with higher perceptions of math perceived competence were more likely to belong to the High on all Goals and Mastery-Oriented profiles relative to the Low on all Goals profile. The relatively low correlations observed between student perceived competence in these two domains (r range = .351–.460; see Table S5 of the Supplementary Materials) suggest an effect that is unique to the math domain, rather than the estimation of multivariate associations involving highly correlated predictors. One possible explanation for this finding is that math knowledge builds upon itself and, as a result, tends to be particularly anxiety-provoking for students, leading to a cycle of avoidance, low performance, and low perceived competence (e.g., Chiu et al., 1990; Harter, 1982; Hembree, 1990; Jansen et al., 2013; Krinzinger et al., 2009; Marsh & Martin, 2011). Future studies should explore the unique mechanisms involved in the association between math and achievement goals, as our results suggest that efforts to enhance math perceived competence may be particularly beneficial. Additionally, as achievement goals often progressively transition from being global (i.e., across subjects) to being domain specific (Józsa et al., 2017), these associations might not be the same in older students for whom there might be a clearer alignment between subject-specific perceived competence and achievement goals.

Achievement Goal Profiles: Implications for Students' Achievement and Anxiety

Consistent with Hypothesis 6 and previous research (e.g., Hornstra et al., 2017; Jang & Liu, 2012; Liu et al., 2020; Pahljina-Reinić & Kolić-Vehovec, 2017; Schwinger et al., 2016), we found that Mastery-Oriented students displayed higher levels academic achievement according to teachers' normative assessment and lower levels of anxiety than their peers corresponding to the other profiles. Furthermore, although some previous studies suggest that performance goals could be adaptive when held alongside mastery goals (Hornstra et al., 2017; Schwinger et al., 2016; Schwinger & Wild, 2012; Zhang et al., 2016), our findings did not strongly support this idea. Indeed, students displaying a High on all Goals profile did not fare better than those displaying Low on all Goals or Low Mastery Goals profiles on any of the outcomes and fared significantly worse than their Mastery-Oriented peers. In sum, these results indicate that students who are predominantly driven by the desire to *develop* their competence tend to experience less anxiety and higher academic achievement than students who are driven either by a desire to *demonstrate* their competence, or not driven at all.

These results demonstrate that achievement goal profiles, defined entirely from students' self-reports, shared relations with teacher reports of academic achievement and with general levels of anxiety (i.e., not specific to the academic domain). In doing so, our results provide strong evidence for the construct validity of these profiles, showing that the implications of our profiles generalize to more objective reports of achievement and spread beyond the academic domain. These results thus reinforce the importance of children's achievement goals by showing that they not only influence how children *do in school*, but also how they feel *more generally*. In this regard, our results indicate that Low Mastery Goals students seem to be the most "at risk" in terms of academic achievement and anxiety, which is worrisome given the high prevalence (40%) and stability (79.4%) of this profile. This finding suggests that, without proper intervention, most of those students may be more likely to maintain their maladaptive goal configuration from one school year to the next.

Achievement Goal Profiles: Practical Implications

Our results have practical implications for educators and school psychologists alike. First, the reliance on a person-centered approach benefits the practice of school psychology by enriching and fine-tuning our understanding of how multiple forms and sources of achievement goals combine to influence academic and emotional wellbeing among distinct categories of students. In this regard, the

identification of discrete types of students differing in their unique achievement goal configurations allows for the creation and implementation of a holistic, targeted, and thus potentially more effective interventions tailored to the unique reality of different types of students (Morin & Marsh, 2015).

Moreover, given the high prevalence of the Low Mastery Goals profile and the clear benefits of mastery goals, it seems appropriate for school psychologists to consider the development of school-wide interventions and recommendations focused on increasing mastery in the classroom. For instance, encouraging teachers to prioritize formative assessment procedures, emphasize individual growth over grades, avoid enabling comparison between students, and design course materials that are personally meaningful for students may be beneficial avenues for intervention (Cauley & McMillan, 2010; Nadon et al., 2020; Yeager et al., 2016). At-risk students (i.e., those with low mastery goals) may benefit from individualized support from school psychologists, like mindset-based interventions aimed at increasing mastery and promoting growth (DeBacker et al., 2018; Yeager et al., 2016). Additionally, goal framing interventions could help students develop personally relevant reasons for learning, which have been linked to increased intrinsic motivation and academic performance (Hardre & Reeve, 2003; Vansteenkiste et al., 2004). Finally, these efforts should also be communicated to parents in a culturally sensitive manner aimed at increasing their awareness of the importance of promoting mastery goals at home, both for student achievement and emotional wellbeing.

Limitations and Future Directions

Despite its strengths, this study is not without limitations. A first limitation stems from our reliance on a dichotomous representation of achievement goals (i.e., mastery versus performance approach goals), rather than a more complex conceptualization (i.e., see Elliot & McGregor, 2001, for approach-avoidance; see Elliot et al., 2011, for task, self, and other approach and avoidance). This decision was intentional given our interest in what drives elementary school students *towards* learning, which is anchored in Maehr and colleagues' social-cognitive perspective on AGT (e.g., Kaplan & Maehr, 2002, 2007; Maehr & Braskamp, 1986; Maehr & Pintrich, 1991). Likewise, this decision was also connected to the age of our sample given previous indications that the approach-avoidance distinction may be less *practically* important for children among whom these types of goals tend to be highly entwined (Schwinger et al., 2016). This decision reflected our desire to consider not only students' goals, but also their perceptions of their parents' and teachers' goals among a sample of roughly 500 students (making it difficult to incorporate additional profile indicators). However, it would be important to replicate the present results among larger samples of children and adolescents, while relying on a more differentiated operationalization of achievement goals. Additionally, by focusing exclusively on achievement goals, the present study offers a relatively narrow examination of students' overall motivation. As such, future person-centered studies may wish to incorporate other motivational processes to derive richer motivational profiles (e.g., task values, mindsets).

A second limitation stems from our reliance on a domain-general representation of achievement goals. This decision was rooted in the fact that, among young children, goals and motivation do not first arise in a domain-specific manner, but rather become more differentiated over time as children develop specific academic interests (Józsa et al., 2017). Additionally, given that students had the same teacher across subjects, we expected that student motivation in one domain would be highly related to their motivation in other domains (Dietrich et al., 2015). However, it would be interesting for future studies to consider how the present results would generalize to domain-specific goals.

Third, by focusing on students' perceptions, we were unable to clearly identify the source of the similarity between students' goals and their perceptions of their teachers' and parents' goals. This similarity suggests a connection between caregivers and children, consistent with the idea that children's perceptions of caregiver achievement goals are important when considering their achievement goal profiles. However, it is difficult to estimate how much of this similarity truly reflects caregivers' influence on children's goals, and how much of it reflects children's self-consistency biases in reporting the goals held for them by their caregivers. In this regard, it would be particularly informative for future studies to also consider teachers' and parents' own reports of the goals they hold for each target child. Doing so would allow for an investigation of the distinction, overlap, and mechanisms at play between these different perspectives.

Fourth, this study is limited by our inability to document the generalizability of our findings beyond the current sample of French-Canadian, low SES, and first/second generation immigrant students. The fact that demographic characteristics (i.e., sex, grade level, and immigration status) did

not influence profile membership lends credence to the robustness of our findings but does not offset the homogeneity of our sample. Indeed, it remains possible that the lack of associations found between our demographic predictors and profile membership could be due to the relative homogeneity (end of primary school, low-SES neighborhoods) of our sample rather than reflect a true null effect. However, it is encouraging to note that most of our results align with those from previous person-centered studies (e.g., Hornstra et al., 2017; In De Wal et al., 2016; Schwinger & Wild, 2012; Schwinger et al., 2016; Zhang et al., 2016). Nonetheless, the Low Mastery Goals profile remains somewhat unique to our study and may reflect the specific background of our sample. Clearly, future studies would need to assess the generalizability of our results more systematically to other samples of students and to more specifically assess the role played by SES and immigration status.

Lastly, our study presents some methodological limitations, such as the reliance on self-report measures and teacher reports of student achievement. In this regard, it would have been beneficial to include more objective measures of our variables, such as parental and teacher reports of their own goals, objective school grades, and even standardized diagnoses of anxiety. In terms of achievement goals, one promising avenue for future research would be to include observational measures of teacher motivational practices to see if students' perceptions match what teachers are actually doing in the classroom (Pintrich et al., 2003). In addition, our reliance on a year-long, two time-point, longitudinal design only captures a relatively short period of time. Although this design allowed us to examine stability and change in profile membership between school years, it makes it challenging to fully grasp how achievement goal profiles truly evolve over the elementary school years and across the transition into secondary school. We know that students' achievement goals tend to become more differentiated as they get older while their endorsement of performance goals tends to increase (e.g., Meece et al., 2003; Schwinger & Wild, 2012; Schwinger et al., 2016). The inclusion of additional measurement points encompassing a longer time interval would have made it possible to consider longer-term change in profile membership and provide an even more rigorous test of their within-sample stability. Future studies would need to consider longer, and more numerous time intervals, possibly even across educational transitions.

Conclusions

It is well-established that mastery goals promote healthy development, that children can hold multiple goals at once, and that children's motivation evolves through interactions with caregivers. Despite these facts, our study is the first longitudinal person-centered examination of how children's personal achievement goals combine with their perceptions of the goals held for them by their parents and teachers. First and foremost, these findings contribute to our understanding of the nature and stability of achievement goal profiles amongst elementary students. Our study also provides new insight into how children perceive the goals held for them by their parents and teachers and offers a first person-centered look into how interconnected these goals seem to be for children. Moreover, the Low Mastery Goals profile inspires several questions for future studies – namely to what extent do socio-cultural factors influence children's achievement goal profiles, and would our profiles generalize to other samples from diversified SES and ethnic backgrounds? The fact that our profiles appeared to be both stable and malleable suggest that they do represent potentially useful guides for interventions. Such interventions should specifically target the low-mastery students who display an elevated risk of academic and socioemotional problems. Students corresponding to the High on All Goals profile could also benefit from interventions designed to help them cope with anxiety, as they reported feeling as anxious as those corresponding to the Low Mastery profile. Also, even if they did not seem to feel more anxious than others, students who are not driven toward any specific achievement goal (Low on All Goals profile) could also benefit from targeted interventions to prevent potential academic difficulties. To this end, we hope that our study highlights the importance of enhancing perceived competence and mastery goals in the classroom and at home. Ultimately, we hope that this study can facilitate further person-centered research and intervention efforts aimed at improving the academic and socioemotional development of children.

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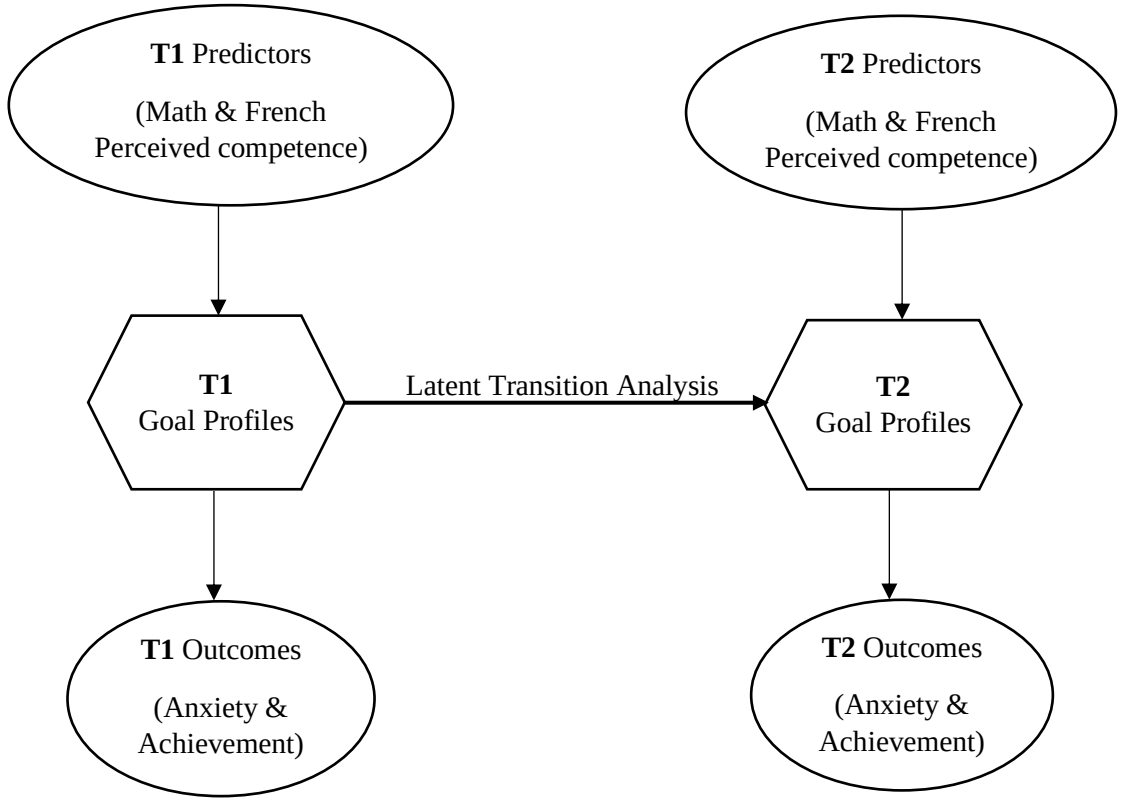

Figure 1. Theoretical Model.

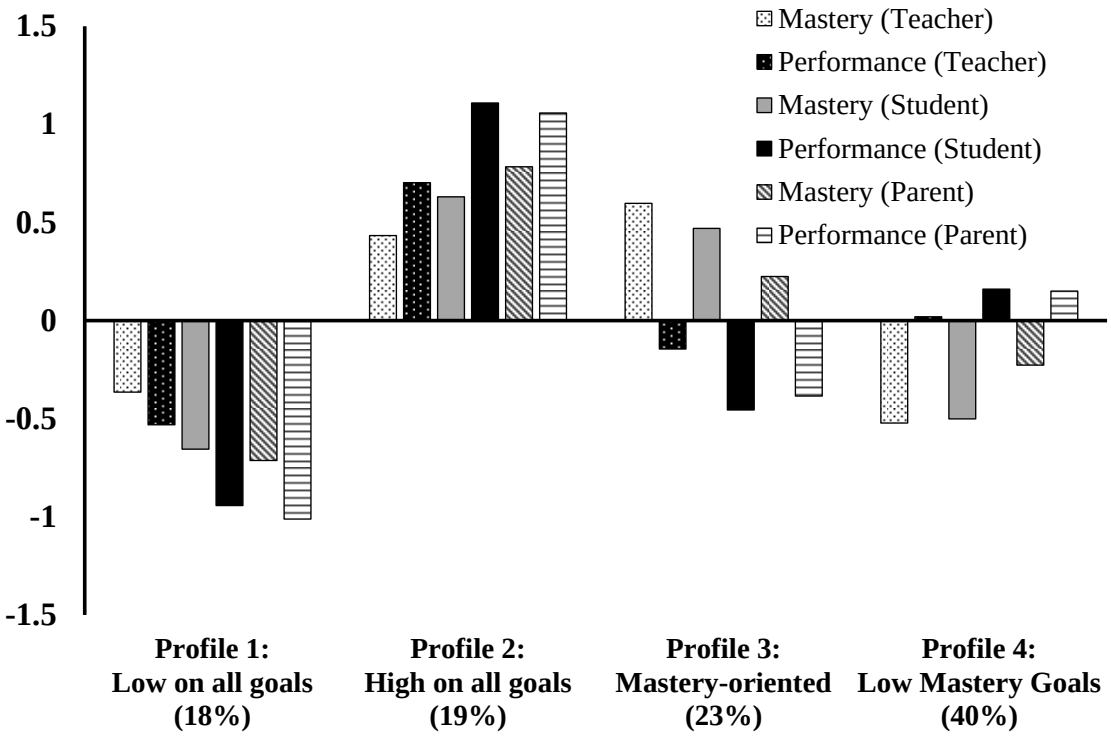

Figure 2. Final 4-Profile Solution (Distributional Similarity).
Note. Profile indicators are factor scores with $M = 0$ and $SD = 1$.

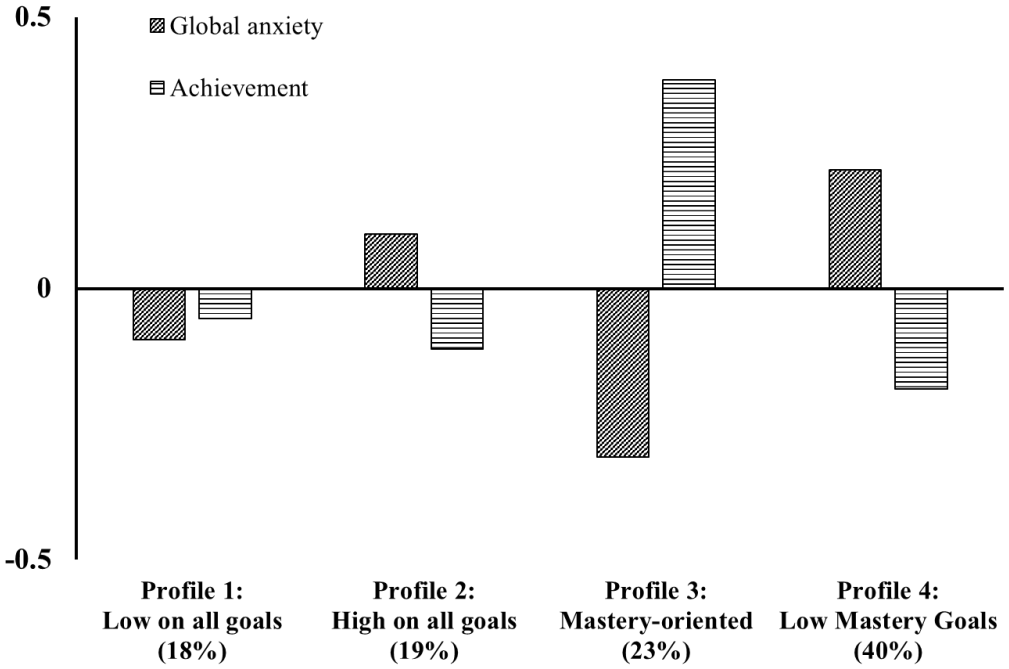

Figure 3. Profile-Specific Outcome Means for the Final 4-Profile Solution (Explanatory Similarity)
Note. Profile indicators are factor scores with $M = 0$ and $SD = 1$.

Table 1

Results from the Latent Profile Analyses

	LL	*#fp*	S.C.	AIC	CAIC	BIC	ABIC	Entropy	aLMR	BLRT
Latent Profile Analysis Time 1										
1 Profile	-4310.926	12	1.010	8645.851	8710.269	8698.269	8660.174	Na	Na	Na
2 Profiles	-3915.630	25	1.437	7881.260	8015.465	7990.465	7911.099	.902	.004	<.001
3 Profiles	-3716.580	38	1.602	7509.161	7713.152	7675.152	7554.516	.889	.256	<.001
4 Profiles	-3569.277	51	1.367	7240.555	7514.332	7463.332	7301.426	.866	.037	<.001
5 Profiles	-3490.208	64	1.333	7108.416	7451.980	7387.980	7184.804	.874	.229	<.001
6 Profiles	-3417.226	77	1.276	6988.451	7401.802	7324.802	7080.355	.886	.074	<.001
7 Profiles	-3360.543	90	1.217	6901.087	7384.223	7294.223	7008.507	.891	.133	<.001
8 Profiles	-3306.610	103	1.116	6819.221	7372.144	7269.144	6942.157	.877	.156	<.001
Latent Profile Analysis Time 2										
1 Profile	-4013.764	12	.982	8051.527	8115.946	8103.946	8065.850	Na	Na	Na
2 Profiles	-3699.353	25	1.738	7448.705	7582.910	7557.910	7478.544	.802	.208	<.001
3 Profiles	-3488.673	38	1.285	7053.346	7257.337	7219.337	7098.702	.839	.015	<.001
4 Profiles	-3355.468	51	1.249	6812.936	7086.714	7035.714	6873.808	.820	.036	<.001
5 Profiles	-3268.290	64	1.139	6664.580	7008.144	6944.144	6740.968	.847	.017	<.001
6 Profiles	-3197.086	77	1.209	6548.172	6961.522	6884.522	6640.076	.867	.223	<.001
7 Profiles	-3134.990	90	1.269	6449.979	6933.116	6843.116	6557.400	.881	.454	<.001
8 Profiles	-3078.357	103	1.231	6362.715	6915.638	6812.638	6485.651	.878	.216	<.001
Longitudinal Latent Profile Analyses: Tests of Profile Similarity										
Configural Similarity	-6924.746	102	1.308	14053.491	14601.046	14499.046	14175.234	.843	Na	Na
Structural Similarity	-6991.665	78	1.393	14139.331	14558.049	14480.049	14232.428	.828	Na	Na
Dispersion Similarity	-7002.673	54	1.584	14113.347	14403.229	14349.229	14177.799	.828	Na	Na
Distributional Sim.	-7010.290	51	1.665	14122.580	14396.357	14345.357	14183.451	.828	Na	Na
Latent Transition Analysis with Demographics										
Effects Free - Time & Profiles	-2756.265	78	.757	5668.530	6093.420	6015.420	5767.779	.777	Na	Na
Effects Free - Time	-2774.668	42	.983	5633.336	5862.122	5820.122	5686.777	.757	Na	Na
Predictive Similarity	-2782.514	33	.940	5631.028	5810.789	5777.789	5673.018	.754	Na	Na
Null Effects Model	-2806.219	24	.929	5660.438	5791.173	5767.173	5690.976	.750	Na	Na
Latent Transition Analysis with Predictors										
Effects Free - Time & Profiles	-3479.911	65	.914	7089.823	7438.755	7373.755	7167.404	.818	Na	Na
Effects Free - Time	-3496.507	41	1.063	7075.014	7295.110	7254.110	7123.950	.800	Na	Na
Predictive Similarity	-3499.660	35	1.059	7069.319	7257.206	7222.206	7111.094	.796	Na	Na
Null Effects Model	-3530.538	29	1.049	7119.076	7274.753	7245.753	7153.689	.792	Na	Na
Latent Transition Analysis with Outcomes										
Effects Free - Time & Profiles	-6300.182	50	1.031	12700.365	12971.689	12921.689	12762.948	.771	Na	Na
Explanatory Similarity	-6313.593	30	1.280	12687.186	12849.98	12819.980	12724.736	.771	Na	Na

Note. LL = loglikelihood; #fp = free parameters; S.C. = scaling correction; AIC = Akaïke information criterion; CAIC = consistent AIC; BIC = Bayesian information criterion; ABIC = sample-size adjusted BIC; aLMR = Lo-Mendel and Rubin's likelihood ratio test; BLRT = bootstrap likelihood ratio test; NA = not applicable.

Table 2

Transition Probabilities for the Final Latent Transition Analysis Model

	Transition Probabilities to Time 4 Profiles			
	Profile 1	Profile 2	Profile 3	Profile 4
Time 1 profiles				
Profile 1	.771	.000	.127	.102
Profile 2	.020	.587	.162	.232
Profile 3	.130	.034	.788	.047
Profile 4	.098	.035	.074	.794

Note. Profile 1: Low on all Goals; Profile 2: High on all Goals; Profile 3: Mastery-Oriented; Profile 4: Low Mastery Goals.

Table 3

Results from the Multinomial Logistic Regressions Predicting Profile Membership

	Profile 1 vs Profile 4		Profile 2 vs Profile 4		Profile 3 vs Profile 4	
Predictors	*Coeff* (*SE*)	*OR*	*Coeff* (*SE*)	*OR*	*Coeff* (*SE*)	*OR*
Math Perceived competence	-.034 (.155)	0.967	.428 (.136)**	1.534	.436 (.135)**	1.547
French Perceived competence	.137 (.171)	1.147	.421 (.125)**	1.523	.477 (.137)**	1.611
	Profile 1 vs Profile 3		Profile 2 vs Profile 3		Profile 1 vs Profile 2	
Predictors	*Coeff* (SE)	*OR*	*Coeff* (SE)	*OR*	*Coeff* (SE)	*OR*
Math Perceived competence	-.471 (0.168)**	0.624	-.008 (.154)	0.992	-.463 (.170)**	0.629
French Perceived competence	-.340 (0.183)	0.712	-.056 (.146)	0.946	-.284 (.176)	0.753

Note. *SE* = standard error of the coefficient; *OR* = Odds Ratio. The coefficients and *OR* reflect the effects of the predictors on the likelihood of membership into the first listed profile relative to the second listed profile. Predictors are factor scores with $M = 0$ and $SD = 1$. Profile 1: Low on all Goals, Profile 2: High on all Goals, Profile 3: Mastery-Oriented, Profile 4: Low Mastery Goals.

**: $p < .01$; *: $p < .05$.

Table 4

Time-Invariant Associations between Profile Membership and the Outcomes (Explanatory Similarity)

	Profile 1		Profile 2		Profile 3		Profile 4		Summary of Significant
	M	95% CI	*M*	95% CI	*M*	95% CI	*M*	95% CI	Differences
Global anxiety	-.095	[-.261, .071]	.100	[-.076, .276]	-.311	[-.480, -.142]	.218	[.108, .327]	1 = 3 < 4; 3 < 2 = 4; 1 = 2
Achievement	-.056	[-.278,.166]	-.111	[-.285, .064]	.385	[.208, .561]	-.185	[-.317, -.053]	1 = 2 = 4 < 3

Note. M = Mean; CI = Confidence Interval; Outcomes are factor scores with $M = 0$ and $SD = 1$. Profile 1: Low on all Goals; Profile 2: High on all Goals; Profile 3: Mastery-Oriented; Profile 4: Low Mastery Goals.

Supplementary Materials
A Longitudinal Person-Centered Representation of Elementary Students' Motivation: Do Perceptions of Parent and Teacher Achievement Goals Matter?

Preliminary Measurement Models: Specification

Models were estimated in *Mplus* 8.4 (Muthén & Muthén, 2019) using the Weighted Least Square estimator with Mean and Variance adjusted statistics (WLSMV) to account for the mixture of binary and ordinal rating scales used to assess all constructs (Finney & DiStefano, 2013). At each time point, missing responses obtained at the item level (Time 1: 0%–8.44%, *M* = 0.45%; Time 2: 0%–10.54%, *M* = 0.43%) were handled using the procedures implemented for WLSMV estimation in Mplus and allowing us to retain all participants (Asparouhov & Muthén, 2010). Due to the complexity of our complete measurement models, these tests were conducted separately for each construct. For achievement goals, perceived competence, and academic achievement we relied on correlated factors CFA models where each factor was defined only by its a priori indicators. For anxiety, we relied on a bifactor-CFA solution (e.g., Morin et al., 2020) based on empirical evidence supporting the superiority of this type of representation for various measures of anxiety (e.g., DeSousa et al., 2014; Molde et al., 2017; Osman et al., 2009, 2010). More precisely, this solution made it possible to directly estimate one global anxiety factor (G-factor) from all items included in our measure of anxiety while accounting for the presence of subscale specificity (S-factors) left unexplained by the G-factor. Tests of measurement invariance over time were conducted for all of these measures in the following sequence, although Steps 2 and 3 had to be combined for anxiety due to the binary nature of the response scale (Millsap, 2011): (a) configural invariance, (b) weak invariance (factor loadings), (c) strong invariance (thresholds), (d) strict invariance (uniquenesses), (e) invariance of the latent variances and covariances, and (f) invariance of the latent means. In these longitudinal models, a priori correlated uniquenesses were included to account for the parallel wording of the matching indicators used over time (Marsh et al., 2013).

The fit of these models was examined using the comparative fit index (CFI; excellent fit ≥ .95, acceptable fit ≥ .90), the Tucker-Lewis index (TLI: excellent fit ≥ .95, acceptable fit ≥ .90), and the root mean square error of approximation (RMSEA; excellent fit ≤ . 06, acceptable fit ≤ .08) with its 90% confidence interval (e.g., Hu & Bentler, 1999; Marsh et al., 2005; Yu, 2002). For tests of measurement invariance, model comparisons relied on an examination of changes (Δ) in these fit indices, where decreases in CFI/TLI ≤ .01 and increases in RMSEA ≤. 015 between one model and the next were taken to support measurement invariance (Chen, 2007; Cheung & Rensvold, 2002). We also report McDonald's (1970) omega (ω) as an estimate of the composite reliability of each factor.

Preliminary Measurement Models: Results

The model fit results associated with the various measurement models estimated for this study are reported in Table S1. For all constructs, the model of configural invariance was able to achieve a satisfactory level of fit to the data and no test of measurement invariance resulted in a decrease in model fit superior to the recommended guidelines, supporting the complete equivalence of these measurement models over time. The parameter estimates from these models are reported in Table S2 (achievement goals), Table S3 (perceived competence and achievement), and Table S4 (anxiety). These results further support the adequacy of our measurement models, revealing that all main constructs appear to be well-defined by satisfactory factor loadings and estimates of reliability: (a) teachers' mastery goals (λ = .635–.815, ω = .747), (b) teachers' performance goals (λ = .722–.797, ω = .796), (c) students' mastery goals (λ = .754–.881, ω = .920), (d) students' performance goals (λ = .847–.924, ω = .957), (e) parents' mastery goals (λ = .667–.804, ω = .867), (f) parents' performance goals (λ = .485–

.922, ω = .814), (g) perceived competence in math (λ = .757–.888, ω = .865), (h) perceived competence in French (λ = .658–.855, ω = .832), (i) academic achievement (λ = .803–.914, ω = .924), and (j) global anxiety (λ = .438–.789, ω = .956).

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Table S1

Goodness-of-Fit Information for the Preliminary Measurement Models

Model	χ^2	df	CFI	TLI	RMSEA	RMSEA 90% CI	$\Delta\chi^2$ (df)
Achievement Goals (6 Correlated Factors)							
Configural	3263.720*	1284	.933	.926	.051	.049, .054	
Weak	3275.135*	1305	.934	.927	.051	.049, .053	22.964 (21)
Strong	3358.634*	1380	.933	.931	.050	.047, .052	107.988 (75)*
Strict	3395.569*	1407	.933	.932	.049	.047, .051	101.487 (27)*
Latent V& CV	3149.934*	1428	.942	.942	.045	.043, .048	35.931 (21)
Latent means	3357.862*	1434	.935	.935	.048	.046, .050	115.106 (6)*
Anxiety (Bifactor: 1 Global Factor and 3 Specific Factors)							
Configural	1773.635*	1384	.974	.971	.022	.019, .025	
Weak/Strong	1834.298*	1432	.973	.971	.022	.019, .025	87.458 (48)*
Strict	1857.309*	1460	.973	.972	.022	.018, .025	38.946 (28)
Latent V & CV	1884.383*	1464	.971	.970	.022	.019, .025	9.888 (4)
Latent means	1899.835*	1468	.971	.969	.022	.019, .025	14.506 (4)*
Academic Achievement (1 Factor)							
Configural	13.179	5	.999	.998	.053	.018, .088	
Weak	14.028	7	.999	.999	.041	.000, .073	0.407 (2)
Strong	17.713	15	1.000	1.000	.018	.000, .044	3.444 (8)
Strict	33.863	18	.999	.999	.039	.017, .058	13.872 (3)*
Latent V & CV	56.635*	19	.997	.998	.058	.041, .076	9.812 (1)*
Latent means	49.776*	20	.998	.998	.050	.033, .068	0.697 (1)
Perceived Competence (2 Correlated Factors)							
Configural	115.325*	40	.988	.980	.057	.045, .069	
Weak	123.643*	44	.987	.981	.056	.044, .067	10.012 (4)
Strong	136.292*	60	.988	.986	.047	.036, .057	16.272 (16)
Strict	171.700*	66	.983	.983	.052	.043, .062	41.517 (6)*
Latent V & CV	176.479*	68	.982	.983	.052	.043, .062	8.083 (2)
Latent means	167.669*	70	.984	.985	.049	.039, .058	2.250 (2)

Note. df = degrees of freedom; χ^2 = chi-square; CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root mean square approximation; CI = 90% confidence intervals for RMSEA; $\Delta\chi^2$ = Chi-square difference test; Latent V & VC = latent variances and covariances.

* $p < .01$

Table S2

Longitudinally Invariant Standardized Parameter Estimates for the 6-Factor Achievement Goals Measurement Model

	Teacher Mastery		Teacher Performance		Student Mastery		Student Performance		Parent Mastery		Parent Performance	
	λ	δ	λ	δ	λ	δ	λ	δ	λ	δ	λ	δ
Item 1	.635	.597	.797	.365	.864	.254	.847	.282	.668	.554	.869	.246
Item 2	.815	.336	.722	.479	.823	.322	.921	.151	.734	.462	.485	.765
Item 3	.656	.570	.737	.457	.754	.431	.923	.148	.679	.539	.922	.149
Item 4	--	--	--	--	.881	.224	.898	.193	.770	.407	.666	.556
Item 5	--	--	--	--	.849	.280	.924	.145	.804	.353	.766	.414
Item 6	--	--	--	--	--	--	--	--	.667	.556	--	--

Note. λ: factor loading; δ: item uniqueness. All coefficients were statistically significant ($p \leq .01$).

Table S3

Longitudinally Invariant Standardized Parameter Estimates for the 2-Factor Perceived Competence and 1-Factor Academic Achievement Measurement Models

	Perceived Competence Math		Perceived Competence French		Academic Achievement	
	λ	δ	λ	δ	λ	δ
Item 1	.888	.212	.855	.269	.803	.355
Item 2	.757	.427	.658	.567	.965	.070
Item 3	.827	.316	.846	.284	.914	.164

Note. Λ = factor loading; δ = item uniqueness. All coefficients were statistically significant ($p \leq .01$).

Table S4

Longitudinally Invariant Standardized Parameter Estimates for the Anxiety Bifactor Measurement Model

	Anxiety G-λ	Worry & Hypersensitivity S-λ	Physiological Symptoms S-λ	Social Concerns/Concentration S-λ	δ
Worry & Hypersensitivity					
Item 1	.604**	.030			.634
Item 2	.588**	.030			.653
Item 3	.752**	.040			.433
Item 4	.639**	.031			.591
Item 5	.630**	.029			.602
Item 6	.776**	.036			.397
Item 7	.733**	.030			.462
Item 8	.789**	.040			.375
Item 9	.680**	.029			.537
Item 10	.702**	.028			.507
Item 11	.767**	.031			.411
Item 12	.787**	.040			.379
Physiological Symptoms					
Item 13	.620**		.338**		.501
Item 14	.628**		.263**		.537
Item 15	.488**		.318**		.661
Item 16	.478**		.203**		.730
Item 17	.594**		.246**		.586
Item 18	.589**		.299**		.564
Item 19	.567**		.254**		.614
Item 20	.438**		.196**		.770
Concentration					
Item 21	.575**			.319**	.567
Item 22	.509**			.212**	.696
Item 23	.678**			.331**	.430
Item 24	.702**			.319**	.405
Item 25	.642**			.313**	.490
Item 26	.754**			.368**	.297
Item 27	.580**			.304**	.572
Item 28	.649**			.276**	.502

Note. λ = factor loading; δ = item uniqueness; G- = global factor from a bifactor measurement model; S- = specific factor from a bifactor measurement model.
* $p < .05$; ** $p < .01$

Table S5

Correlations and Reliability Coefficients

	Variables	α	ω	1	2	3	4	5	6	7	8	9	10	11	12
1	Teacher Perf. Goals T1	.720	.796												
2	Teacher Mast. Goals T1	.606	.747	.248**											
3	Student Mast. Goals T1	.825	.920	.349**	.729**										
4	Student Perf. Goals T1	.922	.957	.446**	.063	.333**									
5	Parent Mast. Goals T1	.678	.867	.395**	.556**	.533**	.395**								
6	Parent Perf. Goals T1	.814	.866	.423**	.093*	.307**	.846**	.503**							
7	Teacher Perf. Goals T2	.734	.796	.348**	-.117**	.065	.347**	.239**	.435**						
8	Teacher Mast. Goals T2	.606	.747	.243**	.584**	.543**	-.010	.320**	-.015	.088*					
9	Student Mast. Goals T2	.861	.920	.191**	.421**	.679**	.220**	.473**	.228**	.198**	.692**				
10	Student Perf. Goals T2	.937	.957	.238**	.007	.111**	.687**	.369**	.707**	.450**	-.076	.244**			
11	Parent Mast. Goals T2	.690	.867	.233**	.393**	.349**	.270**	.566**	.379**	.331**	.545**	.542**	.371**		
12	Parent Perf. Goals T2	.825	.866	.192**	-.060	.063	.623**	.354**	.805**	.442**	-.014	.250**	.826**	.490**	
13	Perceived Competence Math T1	.759	.865	.028	.229**	.180**	.042	.216**	.025	.034	.215**	.209**	.065	.235**	.061
14	Perceived Competence French T1	.750	.832	.035	.295**	.261**	.051	.201**	.005	.027	.274**	.213**	.009	.174**	-.036
15	Perceived Competence Math T2	.837	.865	.034	.252**	.199**	.039	.240**	.040	.064	.289**	.286**	.069	.276**	.075
16	Perceived Competence French T2	.784	.832	.043	.252**	.202**	.054	.207**	-.001	.066	.303**	.257**	.053	.238**	.011
17	Global Anxiety T1	.901	.956	.094*	-.172**	-.091*	.084*	-.046	.153**	.136**	-.119**	-.075	.096*	-.070	.149**
18	Worry & Hypersensitivity T1	.838	.025	.029	.050	.099*	.066	.023	.100*	.046	.010	.026	.029	-.005	.049
19	Physiological Symptoms T1	.695	.475	.080	.023	.008	.021	.002	.001	.038	-.015	-.038	-.002	-.029	-.006
20	Social Conc. & Concentration Diff. T1	.754	.601	.008	-.154**	-.096*	-.052	-.103*	.005	-.016	-.093*	-.089*	-.021	-.051	.025
21	Global Anxiety T2	.910	.956	.051	-.155**	-.107*	.096*	-.034	.124**	.134**	-.112*	-.060	.107*	-.045	.158**
22	Worry & Hypersensitivity T2	.855	.025	.047	.049	.104*	.095*	.029	.105*	.073	.084	.108*	.084	.008	.095*
23	Physiological Symptoms T2	.695	.475	.086	.079	.007	.116*	.103*	.090	.057	-.038	-.038	.070	.043	.062
24	Social Conc. & Concentration Diff. T2	.787	.601	.000	-.158**	-.085	-.034	-.067	.015	.010	-.109*	-.081	-.039	-.057	.015
25	Academic Achievement T1	.905	.924	-.083*	.213**	.047	-.143**	.057	-.170**	-.099*	.190**	.070	-.069	.104*	-.103*
26	Academic Achievement T2	.890	.924	-.102*	.193**	.052	-.129**	.059	-.142**	-.054	.199**	.077	-.077	.132**	-.073

Table S5 – Continued

	Variables	13	14	15	16	17	18	19	20	21	22	23	24	25
13	Perceived Competence Math T1													
14	Perceived Competence French T1	.369**												
15	Perceived Competence Math T2	.840**	.374**											
16	Perceived Competence French T2	.351**	.804**	.460**										
17	Global Anxiety T1	-.235**	-.249**	-.230**	-.178**									
18	Worry & Hypersensitivity T1	.007	-.052	.000	-.004	.189**								
19	Physiological Symptoms T1	-.023	-.001	-.047	.006	.140**	-.236**							
20	Social Conc. & Concentration Diff. T1	-.278**	-.214**	-.220**	-.217**	.150**	-.262**	-.252**						
21	Global Anxiety T2	-.224**	-.171**	-.261**	-.183**	.649**	.050	-.021	.016					
22	Worry & Hypersensitivity T2	.019	.007	.026	.045	.251**	.297**	-.091	-.117*	.280**				
23	Physiological Symptoms T2	-.062	-.011	-.081	-.017	.095*	-.059	.266**	-.168**	.145**	-.199**			
24	Social Conc. & Concentration Diff. T2	-.242**	-.230**	-.287**	-.286**	.176**	-.102*	-.105*	.385**	.189**	-.295**	-.195**		
25	Academic Achievement T1	.448**	.422**	.463**	.442**	-.123**	.038	-.050	-.253**	.005	.111*	-.031	-.247**	
26	Academic Achievement T2	.420**	.412**	.482**	.459**	-.104*	.079	-.076	-.235**	-.012	.119*	-.053	-.250**	.887**

Note. All variables were time invariant factor scores with $M = 0$ and $SD = 1$. T1 = first timepoint; T2 = second timepoint; perf. = performance; mast. = mastery; α = alpha coefficient of scale score reliability; ω = omega coefficient of model-based composite reliability (identical across time wave due to the complete invariance of the measurement models).
* $p < .05$; ** $p < .01$

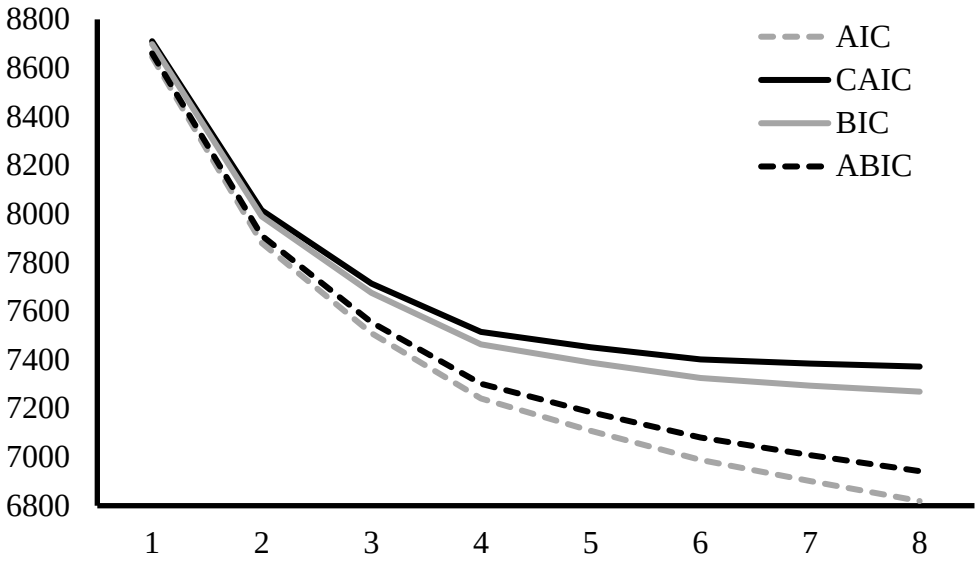

Figure S1. Elbow plot of the information criteria for the Time 1 latent profile analyses.

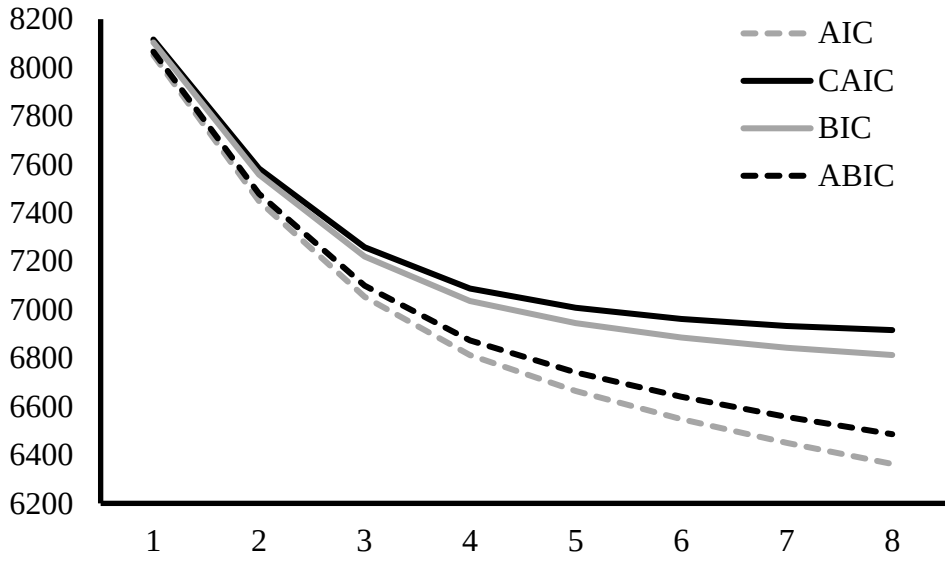

Figure S2. Elbow Plot of the Information Criteria for the Time 2 Latent Profile Analyses.

Table S6

Parameter Estimates from the Final Four-Profile Solution (Distributional Similarity).

	Profile 1		Profile 2		Profile 3		Profile 4	
	M	95% CI	*M*	95% CI	*M*	95% CI	*M*	95% CI
Teachers' Mastery Goals	-.531	[-.762, -.300]	.702	[.557, .848]	-.145	[-.322, .032]	.019	[-.095, .134]
Teachers' Performance Goals	-.365	[-.626, -.105]	.433	[.271, .595]	.597	[.503, .691]	-.522	[-.614, -.430]
Students' Mastery Goals	-.655	[-.902, -.409]	.630	[.498, .762]	.469	[.396, .542]	-.501	[-.646, -.356]
Students' Performance Goals	-.943	[-1.290, -.596]	1.108	[.928, 1.288]	-.456	[-.735, -.178]	.160	[-.039, .358]
Parents' Mastery Goals	-.713	[-.899, -.528]	.783	[.619, .947]	.224	[.101, .347]	-.227	[-.355, -.099]
Parents' Performance Goals	-1.011	[-1.376, -.646]	1.058	[.883, 1.233]	-.385	[-.674, -.096]	.150	[-.055, .355]
	Variance	95% CI	Variance	95% CI	Variance	95% CI	Variance	95% CI
Teachers' Mastery Goals	.571	[.437, .705]	.579	[.452, .706]	.528	[.411, .645]	.385	[.321, .450]
Teachers' Performance Goals	.505	[.305, .704]	.280	[.153, .407]	.107	[.073, .140]	.309	[.259, .359]
Students' Mastery Goals	.544	[.358, .729]	.194	[.106, .281]	.044	[.029, .059]	.345	[.281, .410]
Students' Performance Goals	.244	[.165, .322]	.205	[.109, .300]	.438	[.331, .546]	.264	[.200, .327]
Parents' Mastery Goals	.513	[.355, .670]	.530	[.388, .672]	.246	[.180, .312]	.306	[.240, .372]
Parents' Performance Goals	.258	[.189, .326]	.237	[.159, .316]	.493	[.367, .618]	.252	[.189, .314]

Note. CI = Confidence Interval. Profile indicators are factor scores with $M = 0$ and $SD = 1$. Profile 1: Low on all Goals; Profile 2: High on all Goals; Profile 3: Mastery-Oriented; Profile 4: Low Mastery Goals.