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Validating the English Language Learner Motivation Scale (ELLMS): Pre-college to measure language learning motivational orientations among young ELLs

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ABSTRACT

This study modified and validated a measure of motivational orientations – grounded in self-determination theory and originally developed for postsecondary students – for use with younger (pre-college) English language learners (ELLs). Exploratory factor analysis results in Sample A ($n = 528$) indicated that the data were best explained by a three-factor solution (intrinsic motivation, introjected regulation, and external regulation) that explained 51.6% of the variance. These results were corroborated by a confirmatory factor analysis in an independent Sample B ($n = 529$; GFI = .97, CFI = .96, SRMR = .04, RMSEA = .05). The test for invariance across the two samples further supported the validity of the measure. The modified instrument, named *English Language Learner Motivation Scale (ELLMS): Pre-College*, showed strong psychometric characteristics for use with elementary (ages 9–11 years), middle (ages 12–14 years), and high school (ages 16–17) ELLs. Applications of the measure are discussed.

1. Introduction

Individual differences (IDs) have been defined as the "dimensions of enduring personal characteristics that are assumed to apply to anyone and on which people differ by degree" (Dörnyei, 2005, p. 4). Interest in studying IDs is driven by a trend characteristic of educational psychology in general and of second language acquisition (SLA) research in particular. In SLA, this trend reflects a shift in focus from studying *what* is learned when a new language is acquired (the product) to studying *how* a new language is learned (the process; Fromkin, Rodman, & Hyams, 2007). Dörnyei pointed out that much of variation in second language (L2) or foreign language (FL) attainment has been attributed to IDs and that "no other phenomena investigated within SLA have come even close to this level of impact" (p. 2). Consequently, "there is a considerable body of literature on such variables as language aptitude, motivation and learning styles" as well as their relations to other variables such as age, teaching methods, and learning contexts (Bown, 2007, p. 353).

Motivational orientations, the variable of interest to this study, have been defined as particular reasons for learning an additional language (Noels, Pelletier, Clément, & Vallerand, 2000). Motivational orientations have been linked – either directly or through the mediating effects of other ID variables – to L2 achievement (Ardasheva, 2011; Bernaus & Gardner, 2008; Ehrman & Oxford, 1995; Gardner, 2006; Masgoret & Gardner, 2003; Pae, 2008) as well as to a host of other ID and language learning behavior and attitude variables (Comanaru & Noels, 2009; Csiezér & Dörnyei, 2005; Oxford & Nyikos, 1989; Rubenfeld, Sinclair, & Clément, 2007; Schmidt & Watanabe, 2001; Vandergrift, 2005).

The instrument that has been particularly informative in guiding research and current understandings of motivational orientations and their relationships with other ID variables (e.g., Comanaru & Noels, 2009; Goldberg & Noels, 2006; Pae, 2008; Rubenfeld et al., 2007; Vandergrift, 2005; Wu, 2003) has been Noels et al.'s (2000) *Language Learning Orientations Scale–Intrinsic Motivation, Extrinsic Motivation, and Amotivation Subscales* (LLOS-IEA). This instrument is grounded in self-determination theory (Deci & Ryan, 1985; Deci, Vallerand, Pelletier, & Ryan, 1991). The theory defines motivation against the degree of self-determination and distinguishes between two key motivational subtypes—intrinsic and extrinsic motivations. The instrument has been validated in a sample of college-age Anglo-Canadian L2 learners using exploratory factor analysis techniques and showed good psychometric properties for use with this learner population.

The instrument, however, has been primarily used to study motivation among post-secondary second/foreign/heritage language learners. The validity of LLOS-IEA (Noels et al., 2000) for use with younger learners – particularly with pre-college English language learners (ELLs), a fast-growing school population in English-speaking countries (Goldenberg, 2008; Kaufman & Crandall, 2005) – has not been empirically tested. When LLOS-IEA has been used to conduct research with pre-college (elementary and high school) learners (Vandergrift, 2005; Wu, 2003), the authors modified the instrument to better fit their target

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groups and reported reliability coefficients but stopped short of conducting a thorough examination of the psychometric properties of the modified versions of the instrument. The primary purpose of this study was to modify and validate the LLOS-IEA for pre-college ELL students. Additionally, this study provided some preliminary investigation into the generalizability of SDT constructs to pre-college ELLs.

2. Study background

2.1. Theoretical framework

2.1.1. Motivation in SLA

Language learning motivation has been defined as the drive to learn a new language associated with effort, desire to learn, and positive attitudes toward the language studied (Gardner, 2006). Motivational orientations, in turn, have been defined as sets of reasons for learning an additional language (Noels et al., 2000). While motivational theories, in general, seek to explain why people do what they do, motivation for learning a new language, Dörnyei (1996) argued, represents "a unique situation even within motivational psychology" (p.72) given the unique *personal* and *social* role of language in human experience. On the one hand, Dörnyei argued, language is "an integral part of the individual's identity involved in almost all mental activities" (p. 72); on the other hand, language serves as an interpersonal communication system and as a tool for social organization. In second language contexts, language takes on an additional symbolic value of access to the social, cultural, and material resources (e.g., membership, education, employment) available to the native speakers of the language (Norton, 2006; see also Bourdieu, 1986).

Thus, research on language learning motivation has been influenced by both *social* and *cognitive* theories. In differentiating between these two perspectives, Dörnyei (2003) argued that whereas social theories consider both individuals' ethnolinguistic attitudes (e.g., attitudes toward the L2 and its speakers) and societal variables (e.g., power relationships, language status, language contact), cognitive theories primarily consider an individual learner's characteristics (e.g., perceived locus of causality, perceptions of success, goals) as essential elements underlying motivational dispositions. Two theories – socio-educational model (Gardner, 2006) and self-determination theory (Deci & Ryan, 1985; Deci et al., 1991), representing the social and cognitive perspectives, respectively – have been particularly influential in guiding SLA research. Because the instrument examined in this study was grounded in the self-determination theory, in the following section we examine some of the key premises and criticisms associated with the latter theoretical perspective.[1]

2.1.2. Self-determination theory: premises and criticisms

Deci and Ryan's (1985) self-determination theory (SDT) holds that the individual's "capacity to choose and to have those choices" (p. 38) determines the individual's actions. Thus, SDT developers distinguished between two types of motivation, namely, *intrinsic* and *extrinsic* motivations, whose subtypes are thought to represent points on a continuum from less to more self-determined behaviors. Whereas the sources of self-determined behaviors are believed to lie within personal choice and task relevance, compliance and task irrelevance are believed to be the main regulatory processes underlying controlled behaviors. The authors elaborated:

> Intrinsically motivated behavior has an internal perceived locus of causality: the person does it for internal rewards such as interest or mastery; extrinsically motivated behavior has an external perceived locus of causality: the person does it to get an extrinsic reward or to comply with an external constraint. (p. 49)

In other words, within the SDT framework, personal choice and relevance are thought to give rise to intrinsic motivation and more self-determined behaviors; compliance and lack of personal relevance are associated with extrinsic motivation and controlled behaviors.

The theory offers several advantages to the field of SLA in terms of predicting student successes or failures in acquiring a new language. First, within the SDT framework, more self-determined motivations are thought to be conducive to more optimal learning including increased problem solving flexibility, more efficient knowledge development, an increased sense of self-worth (Deci et al., 1991), and sustained effort (Noels, Clément, & Pelletier, 2001). Second, instructional environments that satisfy inherent human needs for *competence* (the know-how regarding attaining varied external and internal outcomes), *autonomy* (self-initiation and regulation of one's actions), and *relatedness* ("secure and satisfying relationships with others") are thought to maximize more self-determined types of motivation (Deci et al., 1991, p. 327). Relatedly, as expressed within an SDT-subtheory framework termed *cognitive evaluation theory* (CET; Deci, Koestner, & Ryan, 1999), intrinsic motivation – the most self-determined motivational type – is believed to be diminished by tangible rewards such as money or college credit. According to Deci et al. (1999), tangible rewards – when perceived as controllers of behavior – are likely to "thwart satisfaction of the need for autonomy, lead to a more external perceived locus of causality […], and undermine intrinsic motivation" (p. 628).[2] In other words, despite the "innate propensity" of humans to engage in interesting tasks (Deci & Ryan, 1985, p. 38), within CET framework, motivation to engage with even interesting tasks is believed to be diminished by rewards.

The CET premises, however, have met some criticism in the literature (Eisenberger, Pierce, & Cameron, 1999), on the grounds that this framework (a) did not adequately explain the differential effects of rewards reported in the literature and (b) did not consider motivation to engage in low-interest tasks. In offering an alternative theoretical perspective – termed *general interest theory* (GIT) – Eisenberger et al. argued that "intrinsic motives are more diverse than solely competence and self-determination" (p. 678). The authors argued:

> The content of tasks and the context in which they are presented, including reward, increase intrinsic motivation when they convey that task performance helps satisfy needs, wants, or desires. Conversely, task content and context, including reward, reduce intrinsic motivation when they communicate that the task is irrelevant or antithetical to needs, wants, or desires. (p. 678)

Notably, in their meta-analytic re-analysis – including a reward re-categorization schema as well as some additional research – of reward studies synthesized in Deci et al. (1999), Eisenberger et al. (1999) found that rewards, in general, had a positive effect on self-perceived autonomy and intrinsic motivation as measured by engagement in free-choice behaviors and self-reported interest. Rewards contingent on more restrictive performance standards – mastery or normative criteria versus vaguely defined criteria such as 'doing well' – were associated with greater positive outcomes. The authors attributed these results to the *symbolic value of the reward* (i.e., conveying either task triviality or task importance and thus decreasing or increasing self-determination, respectively). Eisenberger et al. further argued that the concept of the symbolic value of the reward – when perceived as being associated with personal (needs, wants, desires, skill development) and social ("identification with the task

[1] Readers interested in learning more about the socio-educational model, are referred to Gardner's work, in particular to Masgoret and Gardner's (2003) meta-analysis of studies grounded in this framework.

[2] On the other hand, when perceived as affirming competence (i.e., informational rewards such as positive feedback), rewards are believed to enhance intrinsic motivation (Deci et al., 1999).

giver's judgment of the task as important") need satisfaction – not only explained the differences in the reward impact, but also provided an explanatory mechanism of how "tasks initially perceived as uninteresting capture interest" (p. 687).

An extended argument on the role of personal and social needs satisfaction as a driving force behind human behavior could be found in Bonny Norton's work conducted with L2 (Norton, 1998; Norton Peirce, 1995) and FL (Lee & Norton, 2009; Norton, 2005; Norton & Kamal, 2003) learners of English. She argued that motivation in L2 (immigrant) contexts may be best understood in terms of *investment in own identity*, which, in conjunction with what the individual brings, can be impacted by global or local social contexts (e.g., societal inequity, power relationships, language status). She wrote: "If learners invest in a second language, they do so with the understanding that they will acquire a wider range of symbolic and material resources [e.g., membership, education, employment] which will in turn increase the value of their cultural capital" (Norton Peirce, 1995, p. 17). In her 1995 longitudinal study of five immigrant women enrolled in a Canadian English-as-a-second-language (ESL) school, Norton Peirce found that gradual development of L2 skills was associated with a self-conception progressing from that of an outsider to that of a "multicultural citizen with the power to impose reception" (i.e., the right to be heard; p. 24). Similar, McKay and Wong (1996, p. 603 as cited in Norton, 2006, pp. 504–505) argued that "the needs, desires, and negotiations of students are not simply distractions or deviations from an ideal language learning situation; on the contrary, they must be regarded as constituting 'the very fabric of students" lives and as determining their investment in learning the target language".

Hence, components of both extrinsic motivation (the context of someone living in a culture that is not one's own) and of intrinsic motivation (satisfaction of inherent human needs for competence, autonomy, and relatedness; Deci et al., 1991) may be simultaneously present in the enhancement of self-concepts among immigrant populations. These theoretical and empirical considerations suggest that a much stronger association between intrinsic and extrinsic motivations may be expected in immigrant populations who are learning a language to navigate within their new country, as opposed to in foreign language contexts in which the new language is not embedded in daily living. These considerations also suggest a need for a closer examination of the generalizability of SDT constructs across different settings and populations and – to enable this research agenda – a consequential need for instrument validation research across different learner populations. In the following paragraphs, we highlight emergent evidence in support of this research agenda by comparing results across different age groups and language learning contexts.

2.2. Research on generalizability of SDT constructs across settings and populations

2.2.1. Investigations of SDT scales: self-determination continuum

One current SDT conceptualization in the field of SLA (Noels et al., 2000) distinguished among seven motivational orientations including: amotivation, three types of intrinsic motivation, and three types of extrinsic motivation. Among intrinsic motivational orientations, Noels et al. distinguished: (a) *intrinsic motivation stimulation*, motivation based on positive sensations such as esthetic pleasure from hearing an L2; (b) *intrinsic motivation accomplishment,* motivation resulting from experiencing positive feelings about an accomplished goal such as understanding a difficult idea in an L2; and (c) *intrinsic motivation knowledge,* behavior motivated by desire to expand one's knowledge such as learning about an L2 culture. Among extrinsic motivational orientations, and following SDT developers (Deci & Ryan, 1985; Deci et al., 1991), Noels et al. distinguished: (a) *identified regulation*, behavior motivated by personal choice or value placed on L2 learning such as choosing to speak more than one language; (b) *introjected regulation*, motivation resulting from internalized pressure such as guilt reduction or a desire to impress others; and (c) *external regulation*, behavior motivated by external means such as reward, punishment, or compliance. These subscales represent a continuum on the self-determination scale ranging from the most self-determined (intrinsic motivation stimulation) to the least self-determined (external regulation) motivational orientations; amotivation is considered to be the end point of the SDT continuum, opposite to both intrinsic and extrinsic motivational orientations.

The existence of the self-determination continuum in Noels et al.'s (2000) SDT scale – LOS-IEA – has been examined in a sample of 159 college-age (average age 22; age range: 18–50) Anglo-Canadian learners of French. Similar to the results of an earlier investigation of SDT scales with primarily native speakers of the language (Ryan & Connell, 1989), a simplex pattern in the intrinsic–extrinsic subscales intercorrelations emerged. That is, the motivational orientation subtypes at widely separated points on the continuum negatively correlated; the subtypes close on the continuum highly positively correlated; and the subtypes at a moderate distance apart yielded lower correlations. Notably, while amotivation negatively and significantly correlated with all – but introjected – intrinsic and extrinsic motivation orientations, the correlations between intrinsic motivation subtypes and external regulation were trivially positive and – with the exception of the accomplishment subscale – not significant. This pattern supported the theoretical continuum between the SDT motivational subtypes, at least for college-age students who "were *voluntarily* attending a school [a French–English bilingual university] where bilingualism is valued" (Noels et al., p. 71; italics added).

Vandergrift (2005), however, found that the theoretically expected simplex pattern was confirmed only partially in a sample of 57 Canadian adolescent learners of French, over half of whom spoke a first language other than English or French. Notably, Vandergrift found that external regulation and all intrinsic motivation subtypes had a strong positive correlation and shared, on average, 39% of the variance in common. Based on these results, the author argued that these motivational scales "may have tapped an identical construct," which the author attributed to adolescent learners' not yet making "fine distinctions in degree of motivation" (p. 78). Yet, in an earlier study of primarily native speakers of the language – investigating motivational orientations within an academic achievement domain – conducted with substantially younger participants (Grades 3–6), Ryan and Connell (1989, see Project 1) found evidence suggesting that young children are capable to clearly discriminate between motivational orientations. In their study, however, the size and directionality of the correlation between external regulation and intrinsic motivation was moderated by student socio-economic status (SES): While trivially positive and non-significant in low/middle SES samples, the correlation was significantly negative in the upper/middle class sample. Ryan and Connell attributed this finding to the differences in associations among motivational orientations in "subjects' meaning networks" (p. 757).

Taken together, the results of these studies suggest that participant characteristics such as age, learning context, and SES (whose investigation is outside of the scope of this paper) may have an impact on mental organization of motivational orientations in individuals and groups of individuals, further highlighting the need for additional investigations on SDT generalizations to different populations. Considering that pre-college ELLs – the population at the heart of this study – are learning an L2 in a context similar to the immigrant populations discussed earlier (Norton, 1998; Norton Peirce, 1995; see also Vandergrift, 2005), it is reasonable to expect that the language learning motivational orientations in this population of students may simultaneously include a complex mix of both intrinsic and extrinsic factors suggesting that a non-simplex pattern in the intrinsic–extrinsic subscale intercorrelations may emerge. Conducting a preliminary investigation of this hypothesis is one of the purposes of this study.

2.2.2. Motivational orientations, L2 proficiency, and other L2 antecedents and outcomes

With some inconsistencies (e.g., Takahashi, 2005; Vandergrift, 2005), a number of studies (e.g., Ehrman & Oxford, 1995; see also Masgoret & Gardner, 2003) found positive significant associations between more self-determined motivational orientations and L2 achievement (e.g., Noels et al., 2001; Wu, 2003). In a sample of 329 learners of English (age range: 18–20) recruited from non-English majors at a Chinese university, Wang (2008), for example, found that motivational orientations explained 26% of the variance in student achievement: Whereas more self-determined orientations positively correlated with the end-of-the course L2 achievement, the correlation with external regulation was negative. A number of studies, however, found evidence of mediated – rather than direct – effects of motivational orientations on L2 proficiency. In a sample of 315 Korean college students learning English as a foreign language (age range: 18–32), Pae (2008), for example, found that intrinsic motivation had a direct impact on motivational intensity and self-confidence; the latter two variables mediated the impact of intrinsic motivation on L2 achievement as measured by standardized L2 proficiency tests. Other studies found that the effect of motivational orientations on L2 achievement was mediated by metacognitive strategies (Ardasheva's 2011 study of school-aged [age range: 9–14] ELLs enrolled in regular education U.S. schools) or by effort (Bernaus & Gardner's, 2008 study of 694 Catalonian learners of English as a foreign language in their last year of compulsory education [average age 15]).

Further, learner motivations, assessed by LLOS-IEA or other motivational measures,[3] have been extensively examined in relation to a host of other IDs and learning outcomes. These L2 antecedents and outcomes included perceived L2 competence (Noels, 2005; Wu, 2003), autonomy (Comanaru & Noels, 2009; Noels, 2005; Wu, 2003), motivational intensity and effort (Comanaru & Noels, 2009; Csiezér & Dörnyei, 2005; Noels et al., 2001; Pae, 2008), active engagement (Noels, 2005), self-confidence (Pae, 2008; Schmidt & Watanabe, 2001), persistence (Comanaru & Noels, 2009; Csiezér & Dörnyei, 2005; Noels, 2005; Noels et al., 2001), patterns of cross-cultural communication such as frequency and quality of L2 contact, cultural identity, and positive L2 attitudes (Noels, 2001, 2005; Pae, 2008), cultural adaptation (Rubenfeld et al., 2007), and language learning strategies (MacIntyre & Noels, 1996; Nunan, 1997; Oxford & Nyikos, 1989; Peacock & Ho, 2003; Schmidt & Watanabe, 2001; Vandergrift, 2005).

Most of the above-mentioned studies – conducted primarily in foreign language contexts – produced results consistent with SDT predictions. Noels (2001), for example, found that intrinsic motivation predicted motivational intensity, L2 persistence, and positive L2 attitudes. In a similar vein, Vandergrift (2005) found "an increasingly strong relationship" (p. 81) between more self-determined forms of motivation and language learning strategies in a sample of 57 Canadian junior high school learners of French (13–14 years old), over half of whom spoke a first language other than English or French. Notably, Vandergrift found that both higher levels of *intrinsic* and *extrinsic* motivations – which for his study were measured by collapsed scores across their respective subscales – were associated with greater strategy use; expectedly, the degree of association was higher for intrinsic motivation.

Rubenfeld et al. (2007), however, provided some evidence contradictory to SDT predictions. The study examined relationships among motivational orientations and cultural adaptation among 64 adult English-as-a-second-language learners under two conditions: (a) intrinsic reward group, learners studying English for personal reasons, and (b) extrinsic reward group, learners studying English for a tangible purpose (admission to an English-speaking university). These conditions represented "two naturally occurring L2 learning groups" (p. 313): A General English Program and an Academic English Program focusing on L2 oral communication and L2 college-level skills development, respectively. Consistently with SDT predictions,[4] intrinsic motivation significantly correlated with measures of acculturation. The correlation between extrinsic motivation and acculturation, however, while negligible in the in the intrinsic reward groups, was positive and substantial (.73) in the extrinsic reward group and was significantly higher than that between intrinsic motivation and acculturation. These results suggested that – at least when it comes to acculturation – extrinsic motivation may play a substantially greater role than predicted by the SDT among immigrant learners studying English for tangible (academic) goals.

However, much of motivational research discussed in this section has been conducted either with college-age students or in foreign or Canadian second language classrooms (see a review by Masgoret & Gardner, 2003). With regard to research conducted with Anglophone L2 learners in Canada, in particular, Noels et al. (2001) argued, "the experience of a majority group member learning the language of a minority group can be quite different than that of a minority group member learning the language of a majority group" in that learning an additional language for a majority group member may be more of "a personal choice," whereas a minority group member "must communicate with people from the dominant group on a regular basis" (p. 427; for a similar discussion see Cummins, 2000). Thus, there is a need to for additional *research* to test the generalizability of the SDT predictions with "other types of language students" (Noels et al., 2000, p. 78), particularly, with younger ELLs in other English-speaking countries. This, in turn, requires motivational orientation measures validated for use with this important student population.

2.3. Present study

The primary purpose of this study was to modify the LLOS-IEA (Noels et al., 2000) and validate the new instrument for use with pre-college ELL students. The modified instrument included four SDT motivational orientation subscales judged as age- and context-appropriate for use with this important student population. To reflect the new target audience, the new instrument was named *English Language Learner Motivation Scale (ELLMS): Pre-College*. Additionally, this study provided some preliminary exploration of SDT continuum generalization to pre-college ELL population.

3. Method

3.1. Population

Data for this study were collected for a research project involving pre-college ELLs receiving language support – English-as-a-second-language (ESL) – services and enrolled in grades participating in state standardized content-area testing (Grades 3–8 and 10–11; ages 9–14 and 16–17 years) in a large U.S. Midwestern urban school district. All regular education ESL-site schools ($n = 40$) in the district were invited to participate; two schools declined. The regular education ESL-site schools provide grade-level curriculum to all ELLs with

[3] Another motivation measure influential in the SLA field is *Attitude Motivation Test Battery* (AMTB; see Masgoret & Gardner, 2003). Most of studies reviewed in this section used either an SDT scale, or the AMTB scale, or a combination of the two measures' subscales.

[4] While SDT does not make any claims about acculturation per se, the SDT framework has been used to study motivational mechanisms in relations to coping, anxiety, and prosocial behaviors (Ryan & Connell, 1989) as well as in relations to frequency and quality of L2 contact, cultural identity, and L2 attitudes (Noels, 2001, 2005; Pae, 2008). Further, building on previous research linking acculturation with enhanced L2 contact, experience of stress and well-being, Rubenfeld et al. (2007) argued that "acculturation experiences pertaining to both the native culture and the mainstream culture […] represent a relevant psychological outcome of L2 learning" (p. 313). Thus, (while we endorse the bilingual perspective) building on previous SDT research findings, one may reasonably expect a strong positive association between measures of acculturation and more self-determined motivational orientations.

content-based instruction (integrated language and content instruction) serving as the primary ESL service supported by bilingual aides.

3.2. Procedures

Data were collected by ESL teachers – with support of bilingual aides, when needed – at the end of the school year. The instruments were administered in English, during regular instructional time. While we recognize that collecting data with an instrument written in a still-developing L2 has potential validity limitations, the nature of the sample as well as the administration procedures both supported that an English-based instrument was appropriate in this context.

To support the use of an English-based instrument with this sample, this study relied on several standard administration procedures to accommodate linguistic needs of ELLs who might otherwise not be able to adequately read English.[5] First, the ESL teachers were instructed to read and explain the directions to the students and to provide language accommodations (e.g., reading items to students, providing oral translations, paraphrasing text either in English or in L1, providing extended time, allowing the use of dictionaries or glossaries) that had been used with the students as part of regular instruction during the school year. In the district where the study was conducted, language accommodations – which a substantial body of research (e.g., Abedi, 2004; Abedi & Lord, 2001; Kopriva, Bauman, Cameron, & Triscari, 2009; Kopriva, Emick, Hipolito-Delgado, & Cameron, 2007) has linked with significant improvement in ELL student performance – are assigned through collaboration of at least two people, including an ESL Instructional Coach and/or Guidance Counselor and an ESL and/or content area teacher, to each newly enrolled student. This is done based on the student's English proficiency placement test data, oral interviews with the student, and data regarding student home language. These accommodations are specified in each student's individualized Program Services Plan and upgraded regularly based on student annual English proficiency testing results and ESL teacher recommendations. In this manner, language accommodations are tailored to individual student linguistic needs, which research (Kopriva et al., 2007) has identified as the most optimal way to provide language accommodations to support ELLs.

Second, the district has several additional procedures to ensure that appropriate language accommodations are provided to ELL students. All ESL teachers in the district receive rigorous training on how to provide language accommodations during instruction and testing – including state-mandated standardized testing in core subject areas – to ELLs at different English proficiency levels without influencing student responses. Further, with L1 support being one of the key accommodations, 100% of the ESL-site schools in the district employ bilingual aides who typically are native speakers of the most prevalent L1s represented locally. Upon enrollment, efforts are made to place ELL students into schools where either the ESL teacher or the bilingual aide speaks the L1 of the student.

Third, the study relied on the ESL teachers' knowledge acquired throughout the school year about their own students' linguistic needs as well as on their knowledge about specific language accommodations offered within their individual schools and classrooms. The researchers – with the assistance of the district's ESL personnel who participated in data collection for the study – requested that only students with a minimum level of English proficiency sufficient to comprehend the instruments' questions – with or without accommodations – were included. Based on these criteria, 374 ELL students (approximately 26% of the entire ELL population in the 38 schools of the study) were excluded from study participation at the teachers' discretion. The Appendix offers evidence that the students who were excluded by the teachers were appropriately excluded based on lack of adequate English to comprehend the questions without accommodations; the percentage of students remaining in the sample who had the lowest level of English proficiency was quite small (<7%).

Finally, the sample reported over 40 different native languages, and even if it were feasible to have the instrument translated into each of those languages, this would pose other validity issues associated with potential translation mismatches in the nuance of item meanings. In addition to this negative effect of using an instrument translated in multiple languages, a translated measure itself would not yield valid results for a substantial portion of the sample because of the weak self-reported L1 reading skills. About 19% of the students had limited or no prior education[6] through their L1s, and 42% of the students indicated that they could not read "at all" (21%) or "not well" (an additional 21%) in their L1s.[7] On the other hand, the sample as a whole had an intermediate English proficiency (see Sample section and the Appendix A for details). These sample characteristics combined with the administration procedures detailed above support that an English-based instrument was a reasonable choice in this study.

3.3. Participants

After removing 59 unusable questionnaires (e.g., questionnaires with exclusively extreme scores such as all 1's), the final sample included 1057 ELL students (651elementary, ages 9–11 years; 275 middle, ages 12–14 years; and 131 high school, ages 16–17 years; 48% female, $M_{age} = 12.21$ years, $SD = 2.80$,) attending 38 schools. The students spoke over 40 native languages. The top five languages included Spanish (48.3%), Maymay (12.5%), Somali (7.2%), Karen (3.8%), and Turkish (3.5%). Average time in the U.S. schools was 42.87 months ($SD = 21.44$), or about 3.6 years. On average, students in the sample had an intermediate English proficiency (median = 3.7; range: 1.7–6.0) as measured by *Assessing Comprehension and Communication in English State-to-State for English Language Learners* (ACCESS; World-Class Instructional Design and Assessment (WIDA) Consortium [WIDA]; 2008). The Appendix summarizes the distribution of English proficiency levels disaggregated by educational levels.

3.4. Attrition analyses

With the intended sample of 1569 students, the total attrition in the study – due to school non-participation, discarded surveys, and ESL teachers not administering the instrument to students they judged unable to offer valid responses in English – was 33%. The study participants did not significantly differ from the attrition sample in terms of socioeconomic status,[8] ethnicity, and gender: $\chi^2(1) = 0.76$, $p = .38$, $\chi^2(4) = 8.13$, $p = .09$, and $\chi^2(1) = 3.89$, $p = .05$, respectively. As anticipated because teachers were asked to only administer the assessments to those with adequate English proficiency (with accommodations), students in the final sample had significantly higher English proficiency, as measured by ACCESS (WIDA, 2008), $\chi^2(1) = 4.75$, $p < .05$.

[5] For future uses of the ELLMS: Pre-College in contexts where accommodations may not a common practice, we recommend to draw on Rubenfeld et al. (2007) who added one item to their instrument (i.e., "How much of the questionnaire did you understand?") and included only students who "understood most" or "understood all" into their analyses (p. 314).

[6] The district assigns a limited-or-no-prior-formal-schooling status to a student if she or he meets any of the following criteria: (a) enrollment in a school with school calendar less than six months a year, (b) enrollment in a school that meets for less than 20 h a week, and (c) no school access or attendance for two or more years (District ESL personnel, personal communication, January 22, 2010).

[7] Self-rated L1 reading skills were measured by an item adopted from Carhill, Suárez-Orozco, and Páez's (2008) *Parental English Language Skills* scale ($\alpha = .90$). The item – "How well do you read your native language?" – was rated on a 4-point scale ranging from 0 = *not at all* to 3 = *very well*.

[8] As measured by student free/reduced-price lunch status.

3.5. Instrumentation: English Language Learner Motivation Scale (ELLMS): Pre-College

This study adapted four subscales from Noels et al.'s (2000) LLOS-IEA. The three-item subscales included intrinsic motivation knowledge, intrinsic motivation accomplishment, introjected regulation, and external regulation (Cronbach's alpha range: .67–.88). These four subscales represent distinct points on the SDT continuum and were judged as developmentally and contextually appropriate for young and early adolescent ELL students.[9] All motivational items represented different reasons for learning an L2 and were presented in random order. A 5-point response scale ranged from 1 = *strongly disagree* to 5 = *strongly agree*.

LLOS-IEA items were modified from the original adult target audience to better fit an elementary and secondary school ELL population. All modifications were conducted with the help of a panel of experts and included two stages. First, the wording of original LLOS-IEA items was simplified by a panel of elementary and ESL education specialists (i.e., an early childhood educator, an elementary ESL teacher, and an ESL specialist) to a Grade 3 reading level. Second, a new panel of experts (three specialists with expertise in educational psychology, ESL, and education) rated the modified items on consistency with the original. The second set of panelists was provided with (a) operational definitions of motivational orientations, (b) a copy of the original LLOS-IEA instrument, and (c) a list of modified items. The panelists rated the modified items for consistency with the original items on a five-point Likert type scale ranging from 5 = *consistent* to 1 = *inconsistent*. Items rated as *consistent* by the panelists were included in the final instrument. Items rated as *somewhat consistent* to *somewhat inconsistent* were further modified using the panelists' suggestions and researcher judgment before entering the final version of the instrument.

The ELLMS: Pre-College was piloted (Dillman, 2007) with six third-grade ELLs with varied levels of English proficiency. Individual pilot testing followed a think-aloud format (i.e., the respondents read or listened to the questions and verbalized their thinking). The results of the pilot indicated that the modified items were appropriate for elementary ELL students; in most cases, students correctly understood both the items' content and intent. The items identified as problematic (four out of 12) were further modified based on student feedback (e.g., children understood the expression "difficult things" more easily than the expression "difficult tasks" or "hard tasks"). After all modifications, the readability level of the instrument as a whole was 3.4 as estimated by the Flesch-Kincaid Grade Level Test. The reliability of ELLMS: Pre-College is reported in the results section; Table 1 shows a list of the instruments' items.

Table 1
Exploratory factor analysis results in Sample A: pattern matrix and factor intercorrelations.

Factor loadings	EXR	INR	IM
1. It is fun to learn a new language.	.14	−.07	**.54**
2. I like learning new things.	.36	−.23	**.55**
3. I like to learn about Americans and how they live.	−.04	.20	**.60**
4. I like it when I do well in English.	.33	−.02	**.51**
5. I like it when I can understand difficult things in English.	−.19	.08	**.80**
6. I like doing difficult things in English.	−.14	.06	**.71**
7. I'll feel bad about myself if I couldn't speak English in my school.	.02	**.82**	.01
8. I'll feel bad about myself if I couldn't speak to my American friends in English.	−.04	**.78**	.16
9. I want to show my teachers that I can learn English.	**.48**	.01	.29
10. I want to find a good job when I grow up.	**.77**	−.05	−.14
11. My parents and teachers want me to learn English.	**.69**	.09	−.01
12. Everybody in school has to learn English.	**.51**	.45	−.17
Factor correlations	1	2	3
External regulation	–		
Introjected regulation	.33	–	
Intrinsic motivation	.55	.34	–

Note. $n_{\text{sample A}} = 528$. Factor loadings > .45 are in boldface. All intercorrelations between factors are significant at $p < .01$. IM = intrinsic motivation. INR = introjected regulation. EXR = external regulation.

3.6. Data analyses

3.6.1. Preliminary analyses

The four selected subscales from Noels et al.'s (2000) LLOS-IEA offered an initial theoretical basis for an a-priori factor structure, and the adapted instrument was first investigated using a Confirmatory Factor Analysis (CFA) approach. However, because of item modification and adaptation to both a new audience (second language learners) and a new target age group (precollege students), the potential for a different set of factors existed. The inadequacy of the four-factor solution was highlighted by this initial CFA analysis which resulted in an inadmissible solution: The latent construct covariance matrix was not positive definite. According to Wothke (1993), a nonpositive definite matrix may be due to: small sample size (i.e., <300), model overfitting, empirical underidentification, and model misidentification. Because (a) this study's sample size was adequate, (b) the moderate number of degrees of freedom (48) indicated a not overly complex model, and (c) the positive number of degrees of freedom indicated that model underidentification was not an issue, model misidentification appeared to be the most plausible explanation for the nonpositive definite matrix. This suggested that the model could be best described by a different set of factors. Thus, the instrument validation procedures reverted to first conducting an exploratory factor analysis (EFA) with half the sample before continuing with the CFA.

3.6.2. Main analyses

Instrument validation procedures proceeded with a calibration–validation design with the total sample randomly split into Sample A ($n = 528$) and Sample B ($n = 529$) supported by EFA in Sample A, CFA in Sample B, and test for invariance across the two samples. Correlational and attenuation analyses served as a statistical technique for conducting a preliminary investigation of the SDT-hypothesized simplex pattern.

Because CFA analyses (a structural equation modeling application; Byrne, 2010) specify an a priori model representing "a series of hypotheses about how the variables in the analysis are generated and related" (Hu & Bentler, 1999, p. 2), the assessment of how well the model fits the data and the estimation of the parameters specified by the model are of primary concern. The assessment of fit in this study was evaluated by χ^2 goodness-of-fit statistic supplemented by a set of more easily interpretable fit indices quantifying "the degree of fit along a continuum" (p. 2). The specific indices assessed in this study included: goodness-of-fit index (GFI), comparative fit index (CFI), the standardized root mean square residual (SRMR), and root mean square error of approximation (RMSEA; Bentler, 1990; Hu & Bentler, 1999; Marsh & Hau, 1996; Marsh, Hau, & Wen, 2004; Shevlin & Miles, 1998). Values equal to or larger than .90 for CFI and GFI[10] and values less than 0.08 for RMSEA and SRMR indicate an acceptable fit. Tests of significance in chi square change ($\Delta\chi^2$) assessed the relative fit of nested models during the test for

[9] The practice of examining different numbers of SDT constructs depending on the field of study and the age of the participants is consistent with previous research (e.g., Comanaru & Noels, 2009; Noels, 2005; Rubenfeld et al., 2007; Wu, 2003; see also Deci et al., 1991).

[10] Hu and Bentler (1999) advocate for a more stringent GFI and CFI cutoff value of equal to or larger than .95; their recommendations, however, have often been misinterpreted and "may have limited generalizability to the levels of misspecification experienced in typical practice" (Marsh et al., 2004, p. 340). This study used the less stringent decisional criteria because the study involved the evaluation of not only single-solution, but also nested (see test for invariance) models.

invariance analyses. All SEM analyses were conducted using AMOS software (Arbuckle, 2008).

4. Results

4.1. Exploratory factor analysis

Factorial structure of the ELLMS: Pre-College was first examined by EFA in Sample A ($n = 528$). The Kaiser–Meyer–Olkin statistic of .85 indicated that the sample size was adequate for the procedure. Principal component analysis and promax[11] rotation served as the extraction and rotation methods, respectively. Factor extraction decision was based on eigenvalues greater than one and the leveling-off point on the scree plot. In evaluating factor loadings, a cut-off value of greater than .45 served as the decisional criterion indicating a statistically significant relationship between the item and its corresponding factor at *p*-level of less than .01 as well as a meaningful (at least 20% of shared variance) relationship between the item and the corresponding factor.

The examination of eigenvalues and the scree plot indicated that – contrary to the expected four-factor solution – the data were best explained by a three-factor solution, with the items designed to measure intrinsic motivation knowledge and intrinsic motivation accomplishment loading together on a single factor (see Table 1), named *intrinsic motivation*. Although unexpected in this study, the identification of intrinsic motivation as a unique construct is consistent with earlier SDT conceptualizations (Deci & Ryan, 1985; Deci et al., 1991; Noels, Clément, & Pelletier, 1999). Further, a number of recent studies (e.g., Noels, 2005; Rubenfeld et al., 2007) have also operationally defined intrinsic motivation as a unique construct. In this study, the three-factor (intrinsic motivation, introjected regulation, and external regulation) solution accounted for 51.6% of the variance in student responses.

4.2. Confirmatory factor analysis

Next, the factorial structure of the ELLMS: Pre-College was examined in Sample B ($n = 529$) using structural equation modeling techniques to conduct a CFA. Grounded in EFA findings, the CFA model included three factors (intrinsic motivation, introjected regulation, and external regulation) and specified Item 9 as loading on external regulation.

Based on the goodness-of-fit indices described earlier in the paper, the ELLMS: Pre-College model provided a good fit to the Sample B: GFI = .966, CFI = .955, SRMR = .039, and RMSEA = .047 with 90% Confidence Interval between [.035; .059]. See Fig. 1 for the final structural model, including standardized regression weights and latent factor correlations.

Both the GFI and the CFI exceeded their cutoff criteria of greater than or equal to .90. This indicated that the model adequately explained the variance and covariance in the ELL student scores and presented a significant improvement over the independence (no relationships) model. The SRMR of .039 and RMSEA of .047 met the criteria of less than .08, which indicated a good fit between the model-specified variance/covariance matrix and the population variance/covariance matrix and an adequate model specification. Additionally, all parameter values in the model were statistically nonzero ($p < .001$), thus supporting adequate model specification. The examination of modification indices produced by CFA analyses showed no evidence of factor cross-loadings and error correlations. Next, the equality (invariance) of factor loading and covariance patterns across the two samples was evaluated using a test for invariance procedure.

[11] Because motivational orientations are hypothesized to be related, an oblique rather than orthogonal rotation was used.

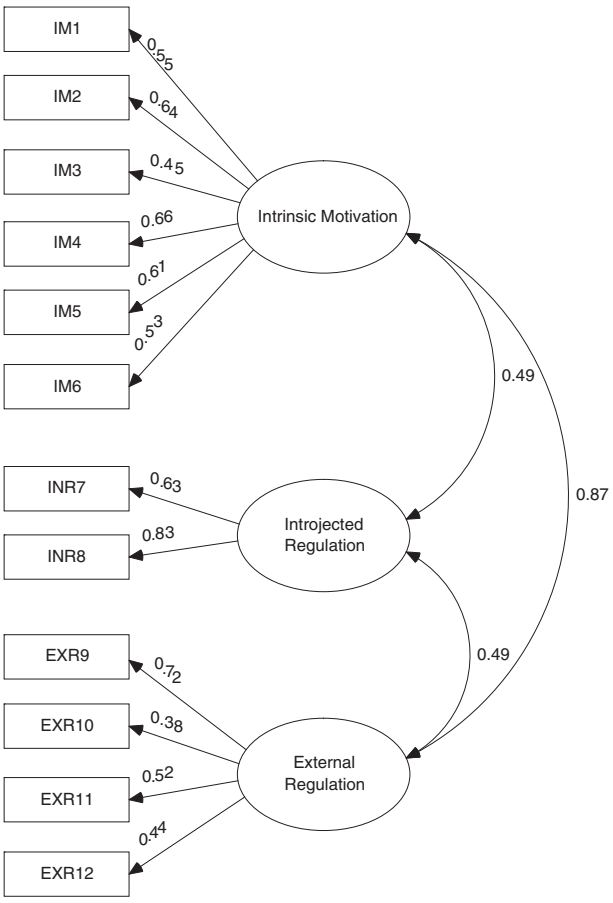

Fig. 1. Confirmatory factor analysis results in Sample B: Standardized regression weights and latent factor correlations. GFI = .966, CFI = .955, SRMR = .039, RMSEA = .047, 90%CI [.035; .059]. $n_{\text{sample B}} = 529$. IM = intrinsic motivation; INR = introjected regulation; EXR = external regulation. All coefficients are significant at $p < .001$.

4.3. Test for invariance

To test for invariance of the three-factor model across Sample A and Sample B, a multigroup baseline model across the two groups was first established. This resulted in a χ^2 (102) = 250.941 (Model 0; see Table 2). This value served as a basis for computing chi square differences with all subsequently specified models, thus allowing for a significance test for tenability of equality constraints specified in these models. The next step was to constrain the factor loadings to be equal across both groups (Model 1). This specification resulted in a χ^2 (111) = 261.19; the comparison of this model with the initial model produced a non-significant chi square difference, $\Delta\chi^2$ (9) = 10.24, $p > .05$, suggesting the equivalence of item measurement (i.e., factor loadings) across both independent samples. The final step

Table 2
Goodness-of-fit statistics for test for invariance across two independent samples.

Model	χ^2	*df*	$\Delta\chi^2$	Δdf	GFI	CFI	SRMR	RMSEA [90%CI]
Model 0	250.94	102	–	–	.962	.942	.039	.037 [.031; .043]
Model 1	261.19	111	10.244^{ns}	9	.960	.942	.040	.036 [.030; .041]
Model 2	261.88	114	10.943^{ns}	12	.960	.943	.040	.035 [.029; .041]

Note. $n_{\text{sample A}} = 528$. $n_{\text{sample B}} = 529$. Model 0 = Baseline model (both groups); Model 1 = Model with factor loadings constrained equal across groups; Model 2 = Model with factor loadings and covariances equal; $\Delta\chi^2$ = chi square change; Δdf = degrees of freedom change; GFI = goodness-of-fit index; CFI = comparative fit index; SRMR = standardized root mean square residual; RMSEA [90%CI] = root mean square error of approximation with 90% Confidence Interval.
^{ns} = non-significant (a non-significant change in model fit from the baseline model).

was to constrain factor covariances to be equal across samples while maintaining the already specified constraints on the factor loadings (Model 2). This specification resulted in a χ^2 (114) = 261.88; the chi square difference between this last model and the baseline model was not significant, $\Delta\chi^2$ (12) = 10.94, $p > .05$, suggesting sample-invariant structural parameters (i.e., factor covariances). The lack of significance related to the most restricted model (Model 2) as compared to the baseline model (Model 0) supported complete invariance of the measurement model between the two independent samples. This suggested that ELLMS: Pre-College was stable regarding measurement parameters (i.e., factor loadings) and structure (i.e., number of factors, factor covariances). Table 2 summarizes the fit indices across all tests for invariance models.

4.4. Reliability estimates of the ELLMS: Pre-College

Reliability of the ELLMS: Pre-College was estimated on the total ($N = 1057$) sample. The overall Cronbach's alpha coefficient was .80 (subscale alphas range: .58–.74; see Table 3). The reliability statistics' range indicated moderate to high level of internal consistency and approached those reported in studies with similar age populations,[12] namely, Ryan and Connell's (1989) investigation of young (Grade 3–6), primarily native English-speaking students and Vandergrift's (2005) investigation of Canadian adolescent learners of French. Alpha ranges reported in those studies were .62–.82 and .57–.70, respectively.

Table 3
Motivational orientation means, standard deviations, and intercorrelations disaggregated by educational level for entire sample (numbers above diagonal represent *r* adjusted for attenuation).

Subscales	*M*	*SD*	1	2	3
Total sample (N = 1057)					
1. External regulation	4.27	0.70	—	.53	.85
2. Introjected regulation	3.83	1.12	.33	—	.49
3. Intrinsic motivation	3.91	0.75	.56	.35	—
Reliability (Cronbach alpha)			.58	.68	.74
Elementary school sample (n = 651)					
4. External regulation	4.30	0.69	—	.52	.85
5. Introjected regulation	3.86	1.12	.32	—	.46
6. Intrinsic motivation	3.93	0.74	.55	.32	—
Reliability (Cronbach alpha)			.58	.65	.73
Middle school sample (n = 275)					
1. External regulation	4.27	0.67	—	.53	.93
2. Introjected regulation	3.74	1.15	.35	—	.52
3. Intrinsic motivation	3.80	0.78	.63	.40	—
Reliability (Cronbach alpha)			.58	.74	.79
High school sample (n = 131)					
1. External regulation	4.14	0.75	—	.58	.85
2. Introjected regulation	3.90	1.01	.37	—	.47
3. Intrinsic motivation	4.01	0.66	.54	.33	—
Reliability (Cronbach alpha)			.59	.70	.69

Note. All intercorrelations are significant at $p < .01$.

4.5. SDT continuum and age influences

Although, due to the number of SDT constructs included in the ELLMS: Pre-College, a comprehensive investigation of the SDT continuum generalization to pre-college ELL population is not feasible in this study, unexpectedly large correlations between two theoretically potentially distant SDT constructs – intrinsic and external regulation orientations – found by both EFA and CFA analyses (see factor correlations in Table 1 and Fig. 1), warrant some further analyses. Thus, here we explore the hypothesized simplex SDT pattern (primarily focusing on the relationships between intrinsic and external regulation motivational orientations) for the combined and disaggregated-by-age samples.

Building on previous SDT research (Noels et al., 2000; Ryan & Connell, 1989; Vandergrift, 2005), the analyses began by computing a Pearson product–moment correlation matrix on the scores of motivational orientations subscales. Next, the subscales' intercorrelations were reliability-corrected or, put differently, adjusted for attenuation (i.e., "assuming a maximum correlation of alpha instead of the standard upper bound of 1"; Vandergrift, 2005, p. 77). These results for the combined and disaggregated-by-age samples are reported in Table 3.

A visual inspection of the means, standard deviations, and intercorrelation patterns in Table 3 suggests that there may not be substantial differences by age level. Notably, the relationship between intrinsic and external regulation motivational orientations was significant and substantial across all age groups. For the combined sample, the two constructs shared 31% in common (shared variance range across age groups: 29%–40%). The results of the reliability-corrected analysis indicate that the findings are not a function of differences in scale reliabilities. Another interesting finding is that external regulation appeared to be the most highly endorsed by the pre-college ELL students in this study; it was immediately followed by intrinsic motivation and interjected regulation. (For the combined sample, for example, the means were 4.27, 3.83, and 3.91, respectively.) These results are similar to those reported in Vandergrift (2005) and suggest a potentially stronger role of extrinsic motivation and its potentially closer relationship with intrinsic motivation among immigrant, pre-college ELLs.

5. Discussion

Given (a) continued theoretical and practical interests in examining the relationship among motivational orientations, other individual difference characteristics, classroom variables, and student language, academic, and social/behavioral outcomes (Ardasheva, 2011; Chen, 2009; Comanaru & Noels, 2009; Csiezér & Dörnyei, 2005; Dörnyei, 1996, 2003, 2005; Ehrman & Oxford, 1995; Oxford & Nyikos, 1989; Pae, 2008; Rubenfeld et al., 2007; Schmidt & Watanabe, 2001; Vandergrift, 2005; Wu, 2003) and (b) the increase of the pre-college ELL population in the United States and other English-speaking countries (Goldenberg, 2008; Kaufman & Crandall, 2005), instruments providing accurate measures of ELL student motivation are essential. The primary purpose of this paper was to modify and validate four SDT motivational orientation subscales from Noels et al.'s (2000) LLOS-IEA for use with pre-college ELL students. To reflect substantial modifications from the original instrument and to capture the new targeted audience, the new instrument was named English Language Learner Motivation Scale (ELLMS): Pre-College. Additionally, this study provided some preliminary investigation into the generalizability of SDT constructs to pre-college ELLs.

The validation of ELLMS: Pre-College included three steps: (1) randomly splitting the sample into two halves and, using the EFA approach, examining the factorial structure of the instrument with Sample A; (2) validating the ELLMS: Pre-College structure in Sample B using CFA techniques; and (3) conducting the test for invariance (equality) of measurement and structural components of the instrument across the two independent samples. The EFA results in Sample A indicated that the data were best explained by a three-factor (intrinsic motivation, introjected regulation, and external regulation) solution that combined the two original intrinsic motivation

[12] These results, however, were lower than those reported in Noels et al.'s (2000). This was not of concern for two reasons. First, lower reliability estimates are expected when the instrument is administered through a non-native, still developing language to heterogeneous (multi-language) groups of language learners (Oxford & Burry-Stock, 1995) as it is often the case with ELL populations. Second, according to Little, Lindenberger, and Nesselroade (1999), structural equation modeling techniques – such as employed in this study (i.e., CFA, test for invariance) – have the ability to accurately correct "for the construct's low measurement quality" and to yield "unbiased estimates of its relations with other constructs" (p. 207).

constructs into one; these results were confirmed by the CFA analysis in the independent Sample B. The test for invariance further supported the validity of the instrument's measurement model. According to Byrne (1993), this validation methodology allowed for a cumulative test across calibration and validation samples of the instrument's number of underlying factors, measurement parameters (i.e., factor loadings), and structure (i.e., factor covariances). According to Little et al. (1999), a methodological advantage offered by this study is that by using structural equation modeling techniques (CFA and test for invariance), this study addressed potential limitations associated with instrument administration through a non-native language to heterogeneous (multi-language) groups of language learners (Oxford & Burry-Stock, 1995). Overall, the ELLMS: Pre-College motivation measure developed in this study showed psychometrically sound characteristics for use with elementary (ages 9–11 years), middle (ages 12–14 years), and high school (ages 16–17 years) ELL students. The instrument offers several advantages for L2 researchers and educators.

5.1. Implications for research

From a theoretical and research perspective, the discrimination among the latent constructs embedded in ELLMS: Pre-College may serve to advance SDT research to test the generalizability of its predictions with ELLs, an underexplored population of language learners. One potential application of the new motivational orientation measure is the examination of the relationships among motivational orientations, self-regulated learning, and classroom variables. This research agenda (Noels, 2001; Noels et al., 1999; Wu, 2003) is a relatively recent, but promising trend in L2 development research. Findings resulting from this line of research suggest that motivation and self-regulated learning may be instructionally manipulated; that is, teacher and classroom variables could support or hinder these characteristics among L2 learners. Research in this area, however, has been primarily conducted either in foreign language classrooms or in postsecondary settings—the generalizability of these findings to young, ELL students should be examined.

Another potential application of the ELLMS: Pre-College is to explore structural relationships among motivational orientations, L2 achievement, and other individual difference characteristics among ELLs. While correlational and regression analyses produced inconsistent results – with some studies reporting significant relationships among motivational orientations and L2 proficiency measures (Ehrman & Oxford, 1995; Wang, 2008) and other studies finding these relationships to be not significant (Takahashi, 2005; Vandergrift, 2005) – a number of studies using structural equation modeling techniques (Ardasheva, 2011; Bernaus & Gardner, 2008; Pae, 2008) found that the motivational orientation's effects on L2 proficiency measures were indirect, that is, mediated by other individual difference variables. These findings suggest a potential benefit for using structural equation modeling applications in future motivational research. Because an adequate fit of measurement models is prerequisite for valid interpretations of structural relationships tests (Kline, 2005), the ELLMS: Pre-College measure – examined through CFA and test for invariance (two structural equation modeling applications) – may serve as a useful tool in advancing this research agenda.

5.2. Implications for practice

From a practical point of view, ELLMS: Pre-College may benefit ELL educators who, as Oxford and Shearin (1994) put it, "want to stimulate students' motivation" (p. 15). Because being able to appropriately measure motivation can lead to subsequent interventions to positively affect this important trait, as well as student L2 attitudes, self-regulation, and instructional effectiveness, accurate measurement of student motivation is key for informing L2 learners' and their teachers' learning and teaching practices. While classroom recommendations on how to enhance ELL pre-college student motivation may be premature without some additional research with this important student population, here we provide some suggestions emanating from SDT foreign language classroom and general interest theory research. To enhance SDT-hypothesized positive antecedents of intrinsic motivation, namely, a sense of perceived competence and a sense of perceived autonomy, Wu (2003) recommends providing students with "predictable learning environment, moderately challenging tasks, necessary instructional support, and evaluation that emphasizes self-improvement" and giving students some choices in terms of selecting "the content, methods and performance outcomes of learning" (p. 513) supplemented with strategy training. To capitalize on human needs to satisfy personal and social "needs, wants, or desires," Eisenberger et al. (1999) recommend that task givers convey the task's relevance and "personal and social significance" by highlighting ways in which high-task-performance will help satisfy such needs.

The latter recommendation may be particularly relevant for immigrant populations who may perceive learning an L2 as an investment in their own identity (Lee & Norton, 2009; Norton, 1998) associated with the acquisition of "a wider range of symbolic and material resources" such as membership in L2 communities and access to education and employment (Norton Peirce, 1995, p. 17). While from the CET perspective (Deci et al., 1999) the attainment of symbolic and material resources may be perceived as an external reward hypothesized to diminish a person's intrinsic motivation (interest and free-choice to continue a given task), the results of this study suggest that there may be a substantially greater overlap between intrinsic and extrinsic motivation in pre-college, immigrant ELLs. In this study's combined sample, in particular, intrinsic and external regulation orientations shared 31% of the variance in common. A narrow range of the shared variance range across age groups (29%–40%) suggests that this relationship may be only minimally affected by age. While comparable findings were reported in Vandergrift (2005), these results may only serve as initial evidence necessitating further investigations of the SDT, its subtheories', and its opposing theories' generalizations to pre-college ELLs.

6. Conclusion

The development and validation of the ELLMS: Pre-College to measure language learning motivational orientations of pre-college ELLs contributes a critical missing component to the field of ELL research. The strong fit of the ELLMS: Pre-College model to a reasonably robust sample of 1057 learners suggests that this instrument might usefully serve the field in this manner. The instruments' discriminating between intrinsic and extrinsic motivational orientations may serve to advance research agendas that wish to include ELL language learning motivation as either a predictor, an outcome, or a mediator variable.

Appendix A. Distribution of English proficiency (ACCESS) levels disaggregated by educational levels.

Proficiency levels[a]	Educational level							
	Elementary		Middle		High		Total	
	n	%	*n*	%	*n*	%	*n*	%
Level 1	45	7.4	15	5.9	9	7.1	69	6.9
Level 2	118	19.3	58	22.7	44	34.9	220	22.1
Level 3	187	30.6	106	41.4	41	32.5	334	33.6
Level 4	183	29.9	64	25.0	24	19.0	271	27.3
Levels 5 and 6	79	12.9	13	5.1	8	6.3	100	10.1

Appendix A (*continued*)

Proficiency levels[a]	Educational level							
	Elementary		Middle		High		Total	
	n	%	*n*	%	*n*	%	*n*	%
N	612		256		126		994	
Median	3.8		3.5		3.2		3.7	

Note. A total of 63 students (6%) had missing English proficiency data; this was primarily due to a student missing at least one of the four assessments (e.g., Speaking, Reading) included in ACCESS (WIDA, 2008), in which case no composite score could be computed.

[a] ACCESS proficiency levels are assigned based on a student's composite score using a weighted formula: Listening (15%), Speaking (15%), Reading (35%), and Writing (35%). In common terminology English proficiency levels are interpreted as follows: Level 1 = *beginning/preproduction*; Level 2 = *beginning/production*; Level 3 = *intermediate*; Level 4 = *advanced intermediate*; Level 5 = *advanced*; and Level 6 = *native-like proficiency*.

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